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MOJAVE BASIN AND RANGE
RAPID ECOREGIONAL ASSESSMENT
FINAL MEMORANDUM I-2-C

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Submitted to:
Department of the Interior
Bureau of Land Management, BC-662
Building 50, Denver Federal Center
P.O. Box 25047
Denver, Colorado 80225-0047
Attn: Craig Goodwin, Ecoregional Assessment Project Manager

Submitted by:
NatureServe
1101 Wilson Boulevard, 15th Floor
Arlington, Virginia 22209

Patrick Crist, Principal Investigator

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Executive Summary

Rapid Ecoregional Assessments (REAs) are the first step in the Bureau of Land Management's (BLM) Landscape Approach. REAs are intended to synthesize existing knowledge and information applicable to all lands and waters within the ecoregion. This synthesis aims to inform subsequent decision making, implementation, and monitoring by BLM and partners within the ecoregion, and should interact with ongoing scientific research as a foundation for science-based land management. REAs are organized into a series of phases and component tasks. Phase 1 includes tasks that clarify the scope, expected data and analyses approaches to be used, and culminating in a detailed workplan for the assessment. Phase 2 completes the preparation of data, conducts agreed-upon analyses, and documents assessment results. This memorandum summarizes the work, decisions, and remaining issues to be resolved for Task 2, Phase 1 for the Mojave Basin and Range Ecoregion (MBR). Here we conduct the assessment of data availability and quality representing the candidate conservation elements and change agents needed to answer the management questions. This memorandum is the final version (I-2-C) which has been revised and finalized by incorporating comments provided at AMT Workshop 2 or submitted separately to BLM.

Task 2 Objectives

The objectives of Task 2 were:

1. Identify available data for the REA and obtain samples or metadata
2. Evaluate the data for utility (content, scale, completeness)
3. Evaluate the data quality (precision, consistency, documentation)
4. Make recommendations about data to be applied
5. Identify data gaps and proposed revisions to management questions, conservation elements, and change agents

Data Identification, Management and Evaluation

NatureServe established a secure file transfer site for the BLM REA work which is being used for transferring data between NatureServe, NatureServe sub-contractors, and data sources. NatureServe has also created a secure collaborative workspace for the REA project team. The Data Management component of this SharePoint site includes resources such as technical instructions and documentation, and a "Master Data List" that NatureServe is using to track work status, conduct data evaluations, and prepare materials for reporting and creating tables. To create the Master Data List, NatureServe initially imported to our SharePoint site the spreadsheet provided by BLM "Att6.2-DMP-DataLayers.xlsx". NatureServe has added a number of attributes to track BLM requirements, as well as for internal data management and tracking purposes.

To ensure standardization and high quality products for BLM, many attributes in the Master Data List were configured as 'controlled value lists' with a menu of values to choose from or "Yes/No" check boxes. Full documentation for the Master Data List was created with definitions for all attributes, information about which are required, and when appropriate examples for the data entry.

The Master Data List is NatureServe's primary tool for managing information about the individual data sets as well as tracking status of the work being conducted. These include:

- information about the data set (filename, data source, citation, description, data type, scale, ISO category, currentness, data agreements, data restrictions / sensitivity, metadata)
- information about data management (filename and location where data resides on NatureServe's servers)
- work status (person requesting the data; data acquisition status and date; who needs to assess the data set; and review status)

- how data will be used in the REA analyses (type of Conservation Element, Change Agent, or place; applicable REA(s))

The Master Data List is also NatureServe's primary tool for conducting the Phase I, Task 2 Data Quality Evaluation. To conduct this data evaluation, NatureServe started with the materials in "Appendix 7: Data Quality Evaluation Worksheet" and enhanced these by including a *Comments* field for each of the eleven Data Quality Evaluation criteria. This *Comments* field allows the expert conducting the data review to explain the assignment of one of the following confidence ratings: Very High, High, Moderate, Low, and Unknown. NatureServe's evaluation also includes information on the intended use of the data, and the suitability for these uses. Based on the information in the data evaluation attributes, NatureServe then assigns an Overall Data Confidence Rating score, again accompanied with comments where relevant.

The data evaluation process employed by NatureServe also encompasses metadata. The Metadata review includes an evaluation of whether the metadata are incomplete (missing key information), minimally complete (has abstract, purpose, currentness, scale, projection, attribute definitions, and contacts), or accepted. The metadata are reviewed to ensure that the projection / coordinates and datum (as appropriate) are provided.

Data Evaluation Results for CEs

As established in memorandum I-1-C, NatureServe is following a "coarse filter/fine filter approach" for Conservation Element (CE) identification to provide an effective focus for the assessment. This approach applies both to the criteria for selection of component elements, and to the various means of their treatment for analysis. Representative ecological types form our initial focus of assessment, and will be treated through mapping, modeling, and various assessment methods. Here these are described under CE Class I – Terrestrial Coarse Filter and CE Class IV Aquatic/Wetland Coarse Filter. Additionally, the desired CE of "highly erodible soils" is addressed under CE Class III – Physical Features. Species data sets are summarized below within CE Class II – Terrestrial Fine Filter and CE Class V Aquatic/Wetland Fine Filter.

CE Class I: Terrestrial Coarse Filter

The terrestrial "coarse filter" includes 13 terrestrial ecological system types and communities that express the predominant ecological pattern and dynamics of uplands across the ecoregion. Among the best available vegetation maps for this area is the Central Mojave Desert map (Thomas et al. 2004). However, since this map only covers a portion of the ecoregion, we have identified additional primary sources for merging with this map. These include ReGAP efforts from the southwest and California. Similarly, the national inter-agency LANDFIRE effort uses the same classification as the basis for their conceptual state-and-transition, vegetation dynamics models and spatial models aimed at characterizing fire regimes. LANDFIRE Existing Vegetation Type (EVT) classifies and maps types closely aligned with the ReGAP efforts. In 2009, NatureServe compiled ReGAP and LANDFIRE EVT to produce a composite national map of the current land cover and terrestrial ecological systems. In that effort (NatureServe 2009), numerous edits were completed and documented to reconcile the various map inputs into an integrated whole. **We will complete additional review and refinement of the NatureServe (2009) map, integrate the Central Mojave map (2004), and use other ancillary map layers to produce a best-available current distribution for terrestrial coarse-filter elements.**

We intend to use several thousand georeferenced samples for spatial modeling of the predominant terrestrial coarse filter units under past, current, and future climate regimes. The LANDFIRE Reference Database (LFRDB) will be augmented with sample data consolidated and labeled for the SW ReGAP and CA ReGAP efforts. **We recommend use of these reference samples, totaling approximately 3,500**

samples, for the REA study area. Additional sample data will be sought throughout the remainder of Phase I.

Part of our assessment of terrestrial coarse-filter CEs includes assessment of long-term trends in extent for each type; where we desire a mapped representation of each unit as it might occur today had no major land conversions occurred. The LANDFIRE Biophysical Settings (BpS) layer depicts, through inductive modeling, 'potential' or 'historical' distributions of terrestrial ecological system types given assumed natural fire regimes have been unaltered. **The LANDFIRE BpS layer – with additional review and refinement – is what we recommend for use in this REA**.

Ecological integrity may be measured through a variety of means. One approach uses mapped ecological classification concepts as a focus (Unnasch et al. 2008). Criteria to evaluate a given coarse-filter CE are documented through conceptual 'state-and-transition' vegetation dynamics models that reflect assumptions about succession and disturbance for a given type. Complementary to these 'state-and-transition' models, NatureServe has established and implemented methods for gauging the quality of 'occurrences' of each CE. Known as "element occurrence ranking criteria" measures of location size, condition, and landscape context are integrated to describe relative quality or condition against an assumed unaltered reference condition. These criteria are available for selected shrubland and riparian types (Appendix II). **We recommend use of these available ecological integrity criteria as inputs to our effort in this REA.**

Approaches to evaluating ecological integrity can also include development of spatial models to reflect patterns of land conversion that directly affect habitats and species. Three existing spatial models exist to gauge landscape conditions relevant to this REA. The SageMap Human Footprint model (2008), the NatureServe Landscape Condition model (2009), and the Theobald Natural Landscapes layer (2010). **Each of these layers would be adequate for use in the REA. During Task 3, we will finalize the uses of these layers, and clarify if additional layers (using these approaches) will be needed.**

CE Class II: Terrestrial Fine Filter

The "fine-filter" includes species that, due to their conservation status and/or specificity in their habitat requirements, are likely vulnerable to being impacted or lost from the ecoregion unless resource management is directed towards their particular needs. For species to be treated in this assessment, we proposed, and the AMT accepted, several selection criteria for inclusion and treatment in the assessment. We continue to apply these criteria in an ongoing effort to finalize our list and approaches that will be used to handle all species meeting our criteria for inclusion, and that effort will be concluded during Phase I of this REA. Appendix III provides a summary of data for representing currently known locations for individual candidate species. These locational data fall into several categories. **Natural Heritage Programs** from this ecoregion maintain a total of 12,357 location records derived from field surveys for our draft list of species CEs within this ecoregion.

A second major source of locational data for species CEs are habitat maps for all terrestrial vertebrates developed through **Gap Analysis projects** during the CA GAP project of the 1990s and the SW ReGAP completed in 2005. Species such as Desert tortoise (*Gopherus agassizii*), will be addressed through the best-available locational data for various habitat components and subpopulation locations. We are still pursuing all best available data for desert tortoise. **Critical habitat designations from the Fish and Wildlife Service** include some 38 species from the MBR, including Bighorn sheep, (*Ovis canadensis*), Desert tortoise, California condor (*Gymnogyps californianus)*, Least bell's vireo (*Vireo bellii pusillus*), Humpback chub (*Gila cypha*), and the Cushionberry milk-vetch (*Astragalus albens*). These data should be adequate for purposes of the REA.

One additional category of habitat information for species CEs includes **identified corridors and crucial habitats as designated through state efforts coordinated by the WGA Western States Decision Support System (DSS) initiative**. We anticipate gaining access to these data in collaboration with the WGA-sponsored Southwest States DSS project. We will need to determine to what degree these

data represent the CE distribution information suitable for the REA or are prioritizations that should perhaps serve more as reporting units.

CE Class III: Physical Feature - Sensitive Soils

For this REA, sensitive soils can be depicted across the ecoregion by combining several spatial data sets. First SSURGO data are available for portions of the ecoregion. Most variables identified by BLM can be extracted from SSURGO data for a meaningful representation of this CE. However, given incompleteness of SSURGO in this area, we will utilize draft soil map information as it becomes available from NV, and CA state offices of Natural Resources Conservation Service (NRCS). We will coordinate with BLM and NRCS scientists to resolve availability issues. During Task 3 we will explore limitations of current data and explore additional modeling needs for these features using $10m^2$ digital elevation for landform models and the spatially coarser STATSGO soils data (possibly further augmented by surficial material lithology data see e.g., Sayre et al. 2009).

CE Class IV: Aquatic Coarse Filter

Aquatic CEs combine what are commonly referred to as 'aquatic' habitats (streams, rivers, lakes, etc.) with 'wetland' communities (marsh, swamp, floodplain bottomlands) and 'riparian' communities (mosaics of wetland and intermittently flooded habitats. The **NatureServe composite ecological systems map** (NatureServe 2009) depicts current distributions of the primary wetland and riparian components of aquatic coarse filter CEs. We propose to complete additional review and refinement of this map using several primary data sources. These include **SSURGO**, where available, for depicting hydric soils, National Wetland Inventory (**NWI**) for wetlands locations; and **NHD Plus** (1:24K scale data) for streams, lakes, intermittent washes, and playas. Data on **desert spring and seep** locations exist primarily for Nevada, but we continue to identify data from surrounding states.

As with terrestrial coarse filter CEs, ecological integrity for aquatic coarse filter CEs is measured through a variety of means. NatureServe has established and implemented methods for gauging the quality of individual occurrences of each CE, as described above for terrestrial CEs. Available standardized, published criteria for aquatic CEs pertain to wetland and riparian ecological system types from the MBR and adjacent ecoregions. **We recommend using these available ecological integrity criteria as inputs to our effort in this REA.**

CE Class V: Aquatic Fine Filter

Similarly referenced above under the terrestrial fine-filter, **Natural Heritage Programs** from this ecoregion maintain several thousand location records derived from field surveys over recent decades. A total of 1,137 records currently exist for our draft list of aquatic species CEs within this ecoregion (Appendix III). Critical habitat designations from the Fish and Wildlife Service include 6 fish species from the MBR. EcoAnalysts Inc., has conducted taxonomic identification of aquatic macro invertebrates, including natives and invasives, for hundreds of projects and hundreds of clients in the Western USA. State Game and Fish agencies also should have additional location and habitat data for aquatic species of concern to the REA. We will explore their availability within the context of discussions with the WGA-sponsored Southwest DSS effort during Phase 1.

Summary of data suitability for CEs.

Conservation Element Category	Number of Elements	Data Suitable?
Basin Dryland Ecosystems	10	high probability
Montane Dryland Ecosystems	3	Yes
Basin Wet Ecosystems	8	high probability
Montane Wet Ecosystems	1	Yes

Conservation Element Category	Number of Elements	Data Suitable?
Nested Terrestrial Habitat-Based Species Assemblages	TBD	high probability
Nested Aquatic Habitat-Based Species Assemblages	TBD	high probability
Individual Species	TBD	high probability
Desired Conservation Elements		
Sensitive soils		TBD

Data Evaluation Results for CAs

We evaluated data to represent the four Change Agent (CA) classes: I – Wildfire, II – Development, III – Invasives, and IV—Climate Change. Sufficient comprehensive data sets exist to model the Wildfire and Climate Change classes although we acknowledge comments on accuracy issues of Landfire data and will further address these in Task 3. For other CAs, there are critical data gaps for which we are still pursuing data sources and will also investigate modeling of these in Task 3. The data availability for the Development and Invasives classes is more limited. However, some Development subclasses are well represented in the extant data and sufficient data exists to adequately depict or readily model urbanization (current and for 2025), infrastructure, energy development (current and potential), air quality impacts, and hydrology. Centroid locations of mining and refuse management are available and the spatial footprint of these features may be approximated with supporting land use/land cover (LU/LC) data (to be explored in Task 3). While we currently have limited data for recreation, more detailed information is forthcoming from the NOC. This will be evaluated along with potential to model OHV distribution in particular will be investigated in Task 3.

Surface disturbances within military use areas (large extents of bare ground, urbanized areas) can be detected using satellite-derived LU/LC classifications. The AMT identified that noise impacts from low-flying and super-sonic aircraft may be an impact but insufficient data exists to represent it. Instead, the AMT's clarified that the BLM would like to avoid potential conflicts between renewable energy development and off-base military activities (flight training, radar, etc).

Given the complex nature and potential effects of exotic ungulate grazing, we have very limited data on this CA and have proposed simplifying the treatment of exotic ungulate grazing from our original proposal during Task 1.

While aquatic invasives are adequately represented, data for their terrestrial counterparts was not as forthcoming or comprehensive. The NOC is providing additional data. Regardless, modeling these species or building upon existing models will be investigated in Task 3. This effort may incorporate disparate sources of location data from counties, the BLM and the LANDFIRE vegetation reference plots. We will also conduct further investigation of the invasive vulnerability component of The Human Footprint map.

Summary of data suitability for CAs.

Change Agent Class	Number of Subclasses	Data Suitable?
Wildfire	2	Yes
Development	10	Variable
Invasives	2	Variable
Climate	TBD	Yes

Data Evaluation Results for Managed Lands & Sites

We found adequate data to represent managed lands, which we categorize as: I—Sites of High Biodiversity, II—Specially Designated Areas of Ecological or CulturalValue, and III—Other Managed Lands. For sites of significant biodiversity value, a number of data sets exist and several are suitable. We will also evaluate crucial habitats and any other similar information created by the Southwest States DSS project as it comes available and seek input from the AMT on utility of those areas as assessment units.

Data Evaluation Results for Management Questions

Treatment of individual management questions (MQs) is described in Appendix IV. Generally, data appears available and suitable to answer most of the MQs though several data sets are yet to be acquired and evaluated. MQs related to exotic ungulate grazing are most tenuous from our data evaluation to date.

Task 2 Identify, Evaluate, and Recommend Potential Data

Introduction

Rapid Ecoregional Assessments (REAs) are the first step in the Bureau's Landscape Approach. REAs are intended to synthesize existing knowledge and information applicable to all lands and waters within the ecoregion. This synthesis aims to inform subsequent decision making, implementation, and monitoring by BLM and partners within the ecoregion, and should interact with ongoing scientific research as a foundation for science-based land management. REAs are organized into a series of phases and component tasks. Phase 1 includes tasks that clarify the scope, expected data and analyses approaches to be used, and culminating in a detailed workplan for the assessment. Phase 2 completes the preparation of data, conducts agreed-upon analyses, and documents assessment results. This memorandum summarizes the work and decisions for Task 2, Phase 1 for the Mojave Basin and Range Ecoregion. Here we conduct the evaluation of data availability and quality representing the candidate conservation elements and change agents needed to answer the management questions. This memorandum is the final version (I-2-c) which has been revised and finalized by incorporating comments provided at AMT Workshop 2 or submitted separately to BLM.

Task 2 Objectives

The objectives of Task 1 were:

1. Identify available data for the REA and obtain samples or metadata
2. Evaluate the data for utility (content, scale, completeness)
3. Evaluate the data quality (precision, consistency, documentation)
4. Make recommendations about data to be applied
5. Identify data gaps and proposed revisions to management questions, conservation elements, and change agents

Memorandum I-2-c Organization

This memorandum summarizes our evaluation of data availability and quality to represent the conservation elements and change agents needed to answer the management questions. Additionally, data that reflect locations of managed lands, specially designated lands, and area of high significance from existing natural resource prioritization efforts (e.g., SWAPs) are also addressed. The memorandum is organized according to the objectives. Details are provided in tables in the appendices.

Data Identification, Management and Evaluation

Secure File Transfer

NatureServe established a secure file transfer site for the BLM REA work that is being used for transferring data between NatureServe, NatureServe sub-contractors, and data sources. The secure file upload requires a username and password, and files placed in this repository can only be retrieved by NatureServe data management staff. This upload resource is being used to allow people to contribute data in a secure manner. For datasets that NatureServe needs to share with REA subcontractors, NatureServe has established a secure file download site that requires a different username and password.

All usernames and passwords are tightly controlled and only distributed to the relevant project team members.

SharePoint Site – Data Management

Based on the materials developed for Phase I Task 1, NatureServe identified the Conservation Elements (CEs), Change Agents (CAs), Places (PLs), and other data desired to evaluate for possible inclusion in the assessment. The responsibility for identifying data sets was assigned to various team members based on areas of expertise but we worked closely with BLM to minimize redundancy in data requests. When possible, we obtained the full data set plus all supporting metadata and reports. When the data were not available, we requested and obtained at a minimum metadata and supporting materials, with sample data as available. As each member of the team worked through their list of data sets, the information was entered in the Master Data List (described below) and the appropriate team experts notified so they could begin the data quality evaluation process.

Using Microsoft SharePoint software, NatureServe has created a secure collaborative workspace for the REA project team. The Data Management component of this SharePoint site includes resources such as technical instructions and documentation, including data management guideline materials provided by BLM, and a "Master Data List" that NatureServe is using to track work status, conduct data evaluations, and prepare materials for reporting and creating tables.

All members of the NatureServe REA team received training via Web-Ex in the proper use of the BLM REA project SharePoint site, and additional support is available as needed by the project Data Management lead and NatureServe IT staff.

To create the Master Data List, NatureServe initially imported to SharePoint the spreadsheet provided by BLM "Att6.2-DMP-DataLayers.xlsx". After reviewing the materials in the document "Rapid Ecoregional Assessment (REA) Data Management Plan: Contractor Guidance", NatureServe added attributes from the following appendices (from BLM's data management guidelines) critical for achieving compliance with those guidelines:

Appendix 7: Data Quality Evaluation Worksheet
Appendix 8: QA/QC Checklist
Appendix 9: Pre-Acquisition Data Assessment Worksheet

In addition, the NatureServe project team added attributes to the Master Data List for internal data management and tracking purposes.

To ensure standardization and high quality products for BLM, many attributes in the Master Data List were configured as controlled value lists with a menu of values to choose from or "Yes/No" check boxes. Full documentation for the Master Data List was created with definitions for all attributes, information about which are required, and when appropriate examples for the data entry.

The SharePoint site allows the NatureServe team the flexibility to have multiple people working collaboratively on the Master Data List and allows customization through filters and creating "views" so that individual users can focus on any subset of attributes and/or data records of interest. Because SharePoint is fully integrated with other Microsoft software, NatureServe can export from the Master Data List to Excel and create tables for reports.

Data Management and Tracking

The Master Data List is NatureServe's primary tool for managing information about the individual data sets as well as tracking status of the work being conducted. These include:

- information about the data set (filename, data source, citation, description, data type, scale, ISO category, currentness, data agreements, data restrictions / sensitivity, metadata)

- information about data management (filename and location where data resides on NatureServe's servers)
- work status (person requesting the data; data acquisition status and date; who needs to assess the data set; and review status)
- how data will be used in the REA analyses (type of CE, CA, or place; applicable REA(s))

Data Evaluation

The Master Data List is also NatureServe's primary tool for conducting the Phase I, Task 2 Data Quality Evaluation. To conduct this data evaluation, NatureServe started with the materials in BLM's "Appendix 7: Data Quality Evaluation Worksheet" and enhanced these by including a *Comments* field for each of the eleven Data Quality Evaluation criteria. This *Comments* field allows the expert conducting the data review to explain the assignment of one of the following confidence ratings: *Very High, High, Moderate, Low,* and *Unknown*. NatureServe's evaluation also includes information on the intended use of the data, and the suitability for these uses. Based on the information in the data evaluation attributes, NatureServe then assigns an Overall Data Confidence Rating score, again accompanied with comments where relevant.

The data evaluation process employed by NatureServe also encompasses metadata. The Metadata review includes an evaluation of whether the metadata are incomplete (missing key information), minimally complete (has abstract, purpose, currentness, scale, projection, attribute definitions, and contacts), or accepted. The metadata are reviewed to ensure that the projection / coordinates and datum (as appropriate) are provided. And the reviewer can enter comments about the metadata, particularly if there are areas that are incomplete or questions that need to be resolved.

Ongoing Use of Master Data List

The SharePoint system that NatureServe has developed for data management, tracking, and evaluation is both powerful and very flexible. NatureServe plans to build upon the existing structure to conduct subsequent evaluations for the REA, including the Phase I Task 3 identification, evaluation and recommendation of Models, Methods, and Tools to conduct the assessment.

In addition, the information already captured in the Master Data List provides the foundation for the Phase II Task 1 compilation and generation of source data sets. We have already begun tracking which data sets have been requested, acquired, and their physical management. This will be expanded to include generated data sets, as well as the scripts and modeling processes used. We will build on the existing "metadata" attributes to track the creation and review of metadata for generated data sets, and will apply the existing Data Quality Evaluation to these generated data sets.

Identified Data Sources and Data Sets

Appendix I identifies and characterizes all data sets evaluated in this Task. Details on the evaluation are described under the CE and CA sections below and their respective appendices as well as data evaluation forms delivered separately to BLM. To date, we have evaluated over close to 200 data sets and recommended many dozens as suitable for the REA.

Data Sources

We identified many data sources and obtained sample data and or metadata from them. The following lists the primary data sources:

- BLM
- USGS

- EPA
- LANDFIRE
- Natural Heritage Programs
- NatureServe
- The Nature Conservancy
- NRCS
- State Wildlife Agencies
- State Water Quality agencies
- NREL
- Mojave Desert Ecosystem Program
- Mojave Desert Managers Group
- California State Mapping Program
- Desert Renewable Energy Conservation Plan (TBD)
- SAGEMAP (USGS)

Data Evaluation Results for Conservation Elements (CEs)

All of the described data sets in this section are proposed for use in the REA following our evaluation unless otherwise described. Conservation Element (CE) data sets were identified and evaluated; with results detailed in Appendices II and III. Here we summarize our evaluation and results by CE Class; with categories reflecting major CE types, their distribution, and ecological integrity. Base biophysical data are most strongly tied to CE distributions and are listed within CE Classes I-V. For this report we have combined "core" and "desired" CEs within each of these categories.

As established in memorandum I-1-C, NatureServe is following a "coarse filter/fine filter approach" for CE identification to provide an effective focus for the assessment. This approach applies both to the criteria for selection of component elements and to the various means of their treatment for analysis. Representative ecological types form our initial focus of assessment and will be treated through mapping, modeling, and various assessment methods. These are described under CE Class I – Terrestrial Coarse Filter and CE Class IV Aquatic/Wetland Coarse Filter. Additionally, the desired CE of "sensitive soils" is addressed under CE Class III – Physical Features. Species data sets are summarized below within CE Class II – Terrestrial Fine Filter and CE Class V Aquatic/Wetland Fine Filter.

CE Class I: Terrestrial Coarse Filter

The terrestrial "coarse filter" includes 13 terrestrial ecological system types and communities that express the predominant ecological pattern and dynamics of uplands across the ecoregion. These classified units: a) characterize each component of the ecoregion conceptual model, b) define the vast majority of this ecoregion's lands and waters, and c) reflect described ecological types with distributions concentrated within this ecoregion. By treating these in our assessment we aim to adequately treat the habitat requirements of most characteristic native species, ecological functions, and ecosystem services. Ecological models (both conceptual and spatial) for these coarse filter elements will form a major focus for this ecoregional assessment. Here we briefly summarize data sets applicable to mapping the location and extent (current and probable/historical) of terrestrial coarse filter units. Additionally, we summarize data sets for use in documenting their natural ecological dynamics and integrity.

Among several local vegetation maps, the Central Mojave Desert vegetation map (Thomas et al. 2004) is likely of highest quality. It utilized the U.S. National Vegetation Classification (US-NVC; *circa 2000*) at the alliance level of that hierarchy, to define map units. The NatureServe terrestrial ecological systems classification (which also links directly to the US-NVC) provided the basis for several current

national or regional map products (see http://www.natureserve.org/explorer/ for more detailed descriptions of ecosystem types listed for this REA). These include ReGAP efforts from the southwest (Lowry et al. 2007) (including NV, AZ, and UT) and CA ReGAP (in progress). Similarly, the national inter-agency LANDFIRE effort uses the same classification as the basis for their conceptual state-and-transition, vegetation dynamics models and spatial models aimed at characterizing fire regimes (http://www.landfire.gov/). LANDFIRE Existing Vegetation Type (EVT) classifies and maps types closely aligned with the ReGAP efforts. In these cases, they also used common input data sets with the ReGAP efforts, including field reference samples and imagery. However, within this project area, there are considerable discrepencies between LANDFIRE EVT and SW ReGAP. We trace many of these to sample plot labeling error since there are distinct differences between expert-labeled ReGAP samples, and subsequent auto-key labels applied by LANDFIRE (to the sample plot).

In 2009, NatureServe compiled ReGAP and LANDFIRE EVT (for California in this project area) to produce a composite national map of the current land cover and terrestrial ecological systems. In that effort (NatureServe 2009), numerous edits were completed and documented to reconcile the various map inputs into an integrated whole. **While this NatureServe (2009) map retains some error, as identified in this project review, we recommend that this map be merged with the Central Mojave map (2004) for this REA.** We propose to complete additional review and refinement of this map using other ancillary map layers to produce a best-available current distribution for terrestrial coarse-filter elements. Additional local data sets, such as existing vegetation maps from districts within the Fort Irwin and other DoD lands, and Joshua Tree National Park, will be accessed to assist with this review and refinement of the ecoregional coverage.

Reference sample data from field surveys identify the vegetation type, physiognomy, and plant species composition. We intend to use several thousand georeferenced samples for spatial modeling of the predominant terrestrial coarse filter units under past, current, and future climate regimes. The LANDFIRE reference database (LFRDB) was developed between 2004 and 2009, consolidating field samples from across federal and non-federal sources for use in spatial modeling. The LFRDB will be reviewed, updated, and augmented (for certain sparsely vegetated and wetland/riparian types) with sample data consolidated and labeled for the SW ReGAP and CA ReGAP efforts. **We recommend use of these reference samples, totaling approximately 3,500 samples, for the REA study area.** The LFRDB and ReGAP data will also provide reference samples for invasive plant species assessment detailed below. See Appendix II for summary statistics on reference samples available for each coarse-filter CE.

Part of our assessment of terrestrial coarse-filter CEs includes assessment of long-term trends in extent for each type; where we desire a mapped representation of each unit as it might occur today had no major land conversions occurred. Three primary data sets exist for this purpose. The LANDFIRE Biophysical Settings (BpS) layer depicts, though inductive modeling, 'potential' or 'historical' distributions of terrestrial ecological system types given assumed natural fire regimes have been unaltered. A second national "footprint" map from USGS (Sayre et al. 2009) aims at the same goal, but through deductive modeling with a more limited set of national spatial data inputs. While the latter data set is suitable national-scaled analysis, **the LANDFIRE BpS layer – with additional review and refinement – is what we recommend for use in this REA**. During Task 3, we will investigate the utility of incorporating available data sets now provided through the NASA TOPS effort (http://ecocast.arc.nasa.gov/), such as ASTER-derived land surface temperature (25m), SRTM-derived topography, or SCAN-derived soil moisture observations, into BpS map refinements. Additionally, NRCS Ecological Site Descriptions, where developed and mapped using SSURGO data, may provide additional useful information for both conceptual models and map refinements to this BpS layer. **We will investigate linkages between existing NRCS Ecological Site Descriptions (and any mapped versions) for integration with these BpS maps.**

Ecological integrity is measured through a variety of means. One approach uses mapped ecological classification concepts as a focus (e.g., Unnasch et al. 2008). Criteria to evaluate a given coarse-filter CE are documented through conceptual 'state-and-transition' vegetation dynamics models that reflect assumptions about succession and disturbance for a given type. These are available in several forms, and will be referenced more fully below under CA Class I – Wildfire. Complementary to these 'state-and-transition' models are criteria to integrate assumptions about ecological condition for each type. NatureServe has established and implemented methods for gauging the quality of 'occurrences' of each CE. Known as "element occurrence ranking criteria" measures of location size, condition, and landscape context are integrated to describe relative quality or condition against an assumed unaltered reference condition. NatureServe methods have evolved over the past decade, and for this REA, some criteria are available from nearby ecoregions that were developed using NatureServe standards *circa* 2000. More recent work from the CO and WA Natural Heritage programs include criteria under more recent 2008 NatureServe standards. These criteria are available for selected shrubland and riparian types (Appendix II). **We recommend use of these available ecological integrity criteria as inputs to our effort in this REA.** This existing information provides input primarily to conceptual modeling, where we state our current assumptions about key ecological attributes that drive ecological processes and support a given recognizable biotic assemblage. For example, these conceptual models make statements about expected natural fire frequency, intensity, and spatial character. They may document current knowledge of hydrologic flow patterns that produce recognizable patterns in riparian vegetation. They may state assumptions about the expected diversity of native plant species one would tend to encounter, and observations on the effects of certain invasive species introductions into the system type. Given these assumptions, measurable criteria and indicators are established for evaluation of the ecological system, either as individual patches, or across a regional distribution. For purposes of this REA, we aim to evaluate established criteria that may be readily applied with available data. In most instances, we will be limited to applying indicators of ecological integrity that can be measured through remote sensing and spatial modeling.

Spatial models that integrate human alterations and ecological effects within this ecoregion have been developed. The Human Footprint in the West map depicts an 'ecological footprint' using 14 land cover variables, including land cover classes and transportation corridors at a base resolution of $180m^2$ (Leu et al. 2008). Following an identical logic, NatureServe completed a similar national model of Landscape Condition using 17 variables and a base mapped pixel resolution of 90m (Comer and Hak 2009) including both 'direct impact' measures and a 'distance decay' function for each input layer. Theobald's Natural Landscapes layer (2010) (see details under Class II: Development section below), provides a third option for consideration. Each of these layers would be adequate for use in the REA though we acknowledge and will address concerns about the latter voiced by USGS AMT reviewers. During Task 3, we will finalize our selection and proposed use of these layers, and propose modified forms of applying these types of models. In most instances, we anticipate being able to create spatial models that depict a) the current location of a given CE, b) a spatial model of apparent landscape conditions that tend to effect the ecological integrity of the CE at any given location, and c) summary information organized into watershed units, regular spatial grids, or other spatial reporting unit, to indicate the relative condition of the CE. To the degree that these same inputs can be developed for each time series scenario of the REA (current, mid-century, and perhaps one date in between), reporting on ecological integrity of a similar nature will be feasible.

CE Class II: Terrestrial Fine Filter

The "fine-filter" includes species that, due to their conservation status and/or specificity in their habitat requirements, are likely vulnerable to being impacted or lost from the ecoregion unless resource management is directed towards their particular needs. For species to be treated in this assessment, we

proposed, and the AMT accepted, several selection criteria for inclusion and treatment in the assessment. These criteria include:

a. All taxa listed under Federal or State protective legislation (including species, subspecies, or designated subpopulations)
b. Full species with NatureServe Global Conservation Status rank of G1-G3[1]
c. Full species or subspecies listed as BLM Special Status and those listed by applicable SWAPs with habitat included within the ecoregion
d. Full species and subspecies scored as *Vulnerable* within the ecoregion according to the NatureServe Climate Change Vulnerability Index (CCVI).

One additional species, mule deer (*Odocoileus hemionus*), was included as a desired conservation element. Appendix III includes a current draft list for the ecoregion for species under criteria a-d above, and has had approximately 160 taxa added since Memo I-2-a was issued. The additional taxa are those we have determined to probably occur in the MBR and are listed by BLM as "sensitive" or "special status" from AZ, CA, NV and UT, or are animals listed in the relevant SWAPs that were not previously on our list. During Task 3, this list will be reviewed by local experts for their inclusion within the ecoregion. We anticipate a number of taxa now on this list will be removed after we determine the details of their distribution. Finalizing the list of species meeting these criteria is an ongoing effort to be concluded during Phase I of this REA.We have established several distinct approaches to treating species that meet established criteria for inclusion in the REA. These include:

- Species assumed to be adequately ***represented indirectly through the assessment of major "coarse-filter"*** ecological systems of the ecoregion. For example, species strongly affiliated with desert springs may be adequately treated in the REA through assessment of desert springs themselves.
- Species assumed to be adequately ***represented indirectly as ecologically-based assemblages***. That is, due to similar group behavior and habitat requirement, a recognizable species assemblage is defined and treated as the unit of analysis. Examples could include bat hibernacula, treating multiple species of bats; all or some of whom are of conservation concern. Similarly, migratory bird stopover sites or raptor nesting/foraging zones could also be treated as multi-species assemblages.
- Species which should be ***best addressed as individuals*** in the assessment. These include those species meeting our criteria for assessment that cannot be presumed to be included in the previous two categories. This will tend to include many major 'landscape' species that range over wide areas within the ecoregion and with clearly distinct habitat requirements from all other taxa of concern.
- Species of concern from the latter category that have ***very narrow distributions; limited to one BLM management jurisdiction,*** we are gathering current locational information, but will not aim to develop conceptual models for these elements. We will continue to work with the AMT to determine appropriate means to spatially represent these elements within this REA.

It also remains an ongoing effort to finalize which approach will be used to handle all species meeting our criteria for inclusion, and that effort will be concluded during Phase I of this REA. Our team will further consult previous relevant work (e.g., Wisdom et al. 2004) and rely on local expertise. Appendix III provides a summary of data for representing currently known locations for individual species. These locational data fall into several categories. Natural Heritage Programs from this ecoregion maintain several thousand location records derived from field surveys over recent decades. These data include field 'observations' and 'element occurrences' of species populations; the latter resulting from a systematic processing of 'observations' into standardized representations that consider

[1] See http://www.natureserve.org/explorer/ranking.htm for NatureServe Conservation Status Rank definitions

distances separating each observation. A total of 11,220 records currently exist for our draft list of terrestrial species CEs within this ecoregion (Appendix III).

A second major source of locational data for species CEs are habitat maps for all terrestrial vertebrates developed through Gap Analysis projects during the CA GAP project of the 1990s and the SW ReGAP completed in 2005. Appendix III references CEs for which we have data from these efforts. Some species have had much greater attention and data developed for their conservation. Species such as Desert tortoise (*Gopherus agassizii*), will be addressed through the best-available locational data for various habitat components and subpopulation locations. We are still pursuing all best available data for Desert tortoise. Critical habitat designations from the Fish and Wildlife Service include some 38 species from the MBR, including Bighorn sheep, (*Ovis canadensis*), Desert tortoise, California condor (*Gymnogyps californianus)*, Least bell's vireo (*Vireo bellii pusillus*), Humpback chub (*Gila cypha*), and the Cushionberry milk-vetch (*Astragalus albens*). These data should be adequate for purposes of the REA.

One additional category of habitat information for species CEs includes identified corridors and crucial habitats as designated through state efforts coordinated by the Western Governor's Association Western States Decision Support System (DSS) initiative. We anticipate gaining access to these data in collaboration with the WGA-sponsored Southwest States DSS project.

CE Class III: Physical Feature - Sensitive Soils

From the current BLM definition: "Sensitive soils" are those identified as having characteristics that make them highly susceptible to impacts or they may be more difficult to restore or reclaim after disturbance -- characteristics such as high wind or water erosion hazard (steep slopes), compaction, moderate to high salinity, low nutrient levels, low water holding capacity (droughty), or high water table (wetland/riparian soils). Information used to identify sensitive soils includes NRCS published soil surveys, ecological site descriptions, local monitoring records and research studies."

For this REA, sensitive soils can be depicted across the ecoregion by combining several spatial data sets. First SSURGO data are available for portions of the ecoregion. Most variables listed above are tracked in some form by polygon and can be extracted from SSURGO data for a meaningful representation of this CE. However, given incompleteness of SSURGO in this area, we will utilize draft soil map information as it becomes available from NV, and CA state offices of NRCS. We will coordinate with BLM and NRCS scientists to resolve availability issues. During Task 3 we will explore limitations of current data and explore additional modeling needs for these features using $10m^2$ digital elevation for landform models and the spatially coarser STATSGO soils data (possibly further augmented by surficial material lithology data see e.g., Sayre et al. 2009).

Additional discussion has centered on the potential treatment of biotic soil crusts. We agreed that treatment of soil crusts is best included within the assessment of ecological integrity for coarse filter CEs where these crusts play a significant role. During task 3 we will review current material (e.g., Rosentrater and Pellant *in prep*.) and document feasible methods for treatment of this issue.

CE Class IV: Aquatic Coarse Filter

As established in memorandum I-1-c, aquatic coarse filter CEs derive from an ecoregion-wide conceptual model that defines all "wet" ecosystem types. These combine what are commonly referred to as 'aquatic' habitats (streams, rivers, lakes, etc.) with 'wetland' communities (marsh, swamp, floodplain bottomlands) and 'riparian' communities (mosaics of wetland and intermittently flooded habitats). We therefore refer to the aquatic coarse filter CEs as "combined aquatic-riparian-wetland" CEs, each of which will contain some combination of "aquatic components," "wetland components," or "riparian components." Our aim is to provide a map depicting historical and current distributions for each of the

nine aquatic coarse-filter CEs identified in memorandum I-1-c. The NatureServe composite ecological systems map (NatureServe 2009) depicts current distributions of the primary wetland and riparian components of aquatic coarse filter CEs. Again, this coverage was derived largely from the SW ReGAP and LANDFIRE EVT maps. The LANDFIRE Biophysical Settings (BpS) map depicts in a generalize fashion, the 'potential' or 'historical' distribution of the CEs. We propose to complete additional review and refinement of these two maps using several primary data sources. These include SSURGO, where available, for depicting hydric soils where natural land cover has been converted; National Wetland Inventory (NWI) for wetlands locations; and NHD (1:24K scale data) and NHD Plus (1:100K and 1:24K scale data) for streams, lakes, intermittent washes, and playas. Desert spring and seep locations exist primarily for Nevada, but we continue to identify data from surrounding states.

As with terrestrial coarse filter CEs, ecological integrity for aquatic coarse filter CEs is measured through a variety of means. NatureServe has established and implemented methods for gauging the quality of individual occurrences of each CE, as described above for terrestrial CEs. These "element occurrence ranking criteria" specify measures of the size, condition, and landscape context with which to describe the relative quality or condition of any occurrence of a CE in comparison to an assumed unaltered reference condition. Available standardized, published criteria for aquatic coarse filter CEs pertain to wetland and riparian ecological system types from the MBR and adjacent ecoregions. NatureServe methods have evolved over the past decade; for this REA, some criteria are available for similar CEs from the nearby ecoregions that were developed using NatureServe standards *circa* 2000. More recent work from the CO and WA Natural Heritage programs include criteria under more recent 2008 NatureServe standards. These criteria are available for selected riparian and other wetland types (Appendix II). **We recommend use of these available ecological integrity criteria as inputs to our effort in this REA.**

The element occurrence ranking criteria for aquatic coarse filter CEs include information on both the biotic and abiotic (physical habitat) condition of a CE occurrence and information on its landscape context, as noted above concerning terrestrial CEs. The identification of these criteria rests on a conceptual ecological model for each CE. For terrestrial and wetland (including riparian) CEs, these models are often state-transition models, as noted above. For aquatic coarse-filter CEs or the strictly aquatic components of combined aquatic-riparian-wetland CEs, these models more often are causal diagrams such as those pioneered by Karr et al. (1986). These "ecological integrity diagrams" identify: a) the key biotic attributes of a CE: b) key abiotic attributes of the CE affecting its biotic attributes; c) key external drivers – aspects of the "landscape context" – affecting the biotic and abiotic attributes of the CE; and d) the causal linkages among them. The key aquatic attributes and drivers identified through these models will be combined with the element occurrence ranking criteria for riparian and wetland CEs to produce integrated lists of ecological integrity criteria for combined aquatic-riparian-wetland CEs. Although development of such ecological integrity models for aquatic-riparian-wetland CEs will take place during Phase I, Task 3, we have framed informal, preliminary versions to guide identification of data with which to assess the biotic condition, abiotic condition, and the status of critical aspects of landscape context for the strictly aquatic components of combined aquatic-riparian-wetland CEs.

Specifically, we have identified sources for data on:

- Biotic condition: aquatic bioassessment data from federal and state monitoring programs; and data on native aquatic species distributions and aquatic non-native (nuisance) species distributions (see Invasives CA discussion below).
- Abiotic condition: data on the proportion of annual stream flow resulting from groundwater discharge (baseflow); monthly mean discharge; the spatial extent of perennial versus intermittent flow; water quality; the distribution of dams; and habitat quality.
- Landscape context: data on snowpack and aquifer recharge dynamics; near-stream and watershed land cover and land use (see discussion of Landscape Condition for terrestrial CEs, above); water

use in the surrounding surface watershed and contributing groundwater zone; and atmospheric deposition of N (nitrogen), a representative potential acidification agent as well as a nutrient) and Hg (mercury), a representative potential bioaccumulative pollutant). To support the analysis of landscape context, we have also identified sources of data with which to identify the basin fill aquifers potentially responsible for sustaining base flow or base water elevations in aquatic CEs, and the watershed zones within each HUC potentially most responsible for generating surface runoff to streams and recharge to basin fill aquifers.

Additional dataset for assessing aquatic coarse-filter

Desert Research Institute Springs Ecosystems database: Dr. Don Sada of DRI has collected data from more than 2000 springs in the desert southwest including BLM's Mojave and Central Basin and Range ecoregions. This database includes endemic and invasive macroinvertebrate and fish locations and environmental variables associated with these taxa. Many of the springs have never been sampled or the historic data are outdated. Dr. Sada is willing to compile most of the data into a useable format for BLM and NatureServe pending funding. NatureServe has contacted Dr. Sada and asked him for a one to two page summary of his database, the amount of funding he is requesting and an estimated delivery date. We will provide this information to the NOC when we receive it from Dr. Sada.

CE Class V: Aquatic Fine Filter

Similarly referenced above under the terrestrial fine-filter, Natural Heritage Programs from this ecoregion maintain several thousand location records derived from field surveys over recent decades. These data include field 'observations' and 'element occurrences' of aquatic species (fish and aquatic invertebrate) populations; the latter resulting from a systematic processing of 'observations' into standardized representations that consider distances separating each observation. A total of 1,137 records currently exist for our draft list of aquatic species CEs within this ecoregion (Appendix III). Critical habitat designations from the Fish and Wildlife Service include 6 fish species from the MBR. EcoAnalysts Inc., (included on our consultant team) has conducted taxonomic identification of aquatic macroinvertebrates, including natives and invasives, for hundreds of projects and hundreds of clients in the Western USA. These data are included within the datasets from state and federal aquatic bioassessment monitoring programs noted above. With additional refinement of our assessment approach, we may pursue additional data acquisition from this source. State Game and Fish agencies also should have additional location and habitat data for aquatic species of concern to the REA. We will explore their availability within the context of discussions with the WGA-sponsored Southwest DSS effort.

Ecological integrity assessment for the aquatic fine-filter will be subsumed within the analysis of the aquatic coarse filter CEs. Those data sets were reviewed in the previous section.

Data Evaluation Results for CAs

Data sets evaluated and results for CAs are detailed in Appendix IV. Here we summarize our evaluation and results by CA Class. All of the described data sets below are proposed for use in the REA following our evaluation unless otherwise described.

Class I: Wildfire

We identified and evaluated LANDFIRE's (www.LANDFIRE.gov) geospatial layers and data products to represent the Wildfire CA class. We conclude that LANDFIRE is suitable for the REA purposes. LANDFIRE products describe existing vegetation composition and structure, potential

vegetation, surface and canopy fuel characteristics, simulated historical fire regimes, and current departure from simulated historical vegetation conditions. LANDFIRE data sets and models are based on peer-reviewed science and create consistent and comprehensive fire-ecology products that are standardized across the entire United States. LANDFIRE data products consist of over 50 spatial data layers in the form of maps and other data that support a range of land management analysis and modeling.

Specific data layer products within the database include:

Fire Regime Condition Class

Fire regime condition class (FRCC) is a discrete metric that quantifies the amount that current vegetation has departed from the simulated historical vegetation reference conditions. We have noted discrepencies in FRCC map products along map zone boundaries. These result from application of models with conditions within map zones (i.e., the land area across the boundary is 'unknown' to the model). During Task 3 we will investigate options to address this issue.

Fire Regime Condition Class departure

The (FRCC) Departure Index data product uses a range from 0 to 100 to depict the degree to which current vegetation has departed from simulated historical vegetation reference conditions. FRCC departure reflects changes in community structure and fire frequency and severity.

Mean Fire Return Interval

Mean Fire Return Interval layer quantifies the average period between fires under the presumed historical fire regime. This frequency is derived from vegetation and disturbance dynamics simulations using LANDSUM.

Percent of all fires that are low severity

The Percent of Low-severity Fire layer quantifies the amount of low-severity fires relative to mixed- and replacement-severity fires under the presumed historical fire regime. These data are critical for parameterizing VDDT state-and-transition models. We have noted concern over burn severity map outputs and will review each layer in detail during Task 3 methods testing.

Percent of all fires are stand replacement severity

The Percent of Replacement-severity Fire layer quantifies the amount of replacement-severity fires relative to low- and mixed-severity fires under the presumed historical fire regime. These data are critical for parameterizing VDDT state-and-transition models.

Percent of all fires that are mixed severity

The Percent of Mixed-severity Fire layer quantifies the amount of mixed-severity fires relative to low- and replacement-severity fires under the presumed historical fire regime. These data are critical for parameterizing VDDT state-and-transition models.

Environmental Site Potential

The LANDFIRE Environmental Site Potential (ESP) layer represents the vegetation that could be supported (without regard to natural disturbance) at a given site based on the biophysical environment. These data are classified using the NatureServe terrestrial ecological systems classification.

Biophysical Settings

The Biophysical Settings (BpS) layer represents the vegetation that may have been dominant on the landscape prior to Euro-American settlement and is based on both the current biophysical environment and an approximation of the historical disturbance regime. Some have noted apparent inconsistencies within this layer. During Task 3 we will a) integrate available Ecological Site Descriptions with coarse filter CE conceptual models, and b) investigate options for improvement of BpS map layers where apparent error is identified.

Existing Vegetation

The Existing Vegetation Type (EVT) layer represents the vegetation currently present at a given site. These data are classified using the NatureServe terrestrial ecological system classification. As per previous comments under CE Terrestrial Coarse-filter maps (page 14), this layer map will only be used

for portions in California, in combination with other data layers and with additional edits applied to error-prone areas.

LANDFIRE National Vegetation Dynamics Development Tool (VDDT) models

This data library provides access to quantitative state-and-transition models for each mapped BPS. Outputs from these models were used to produce the BPS, FRCC departure, and other modeled data layers distributed by LANDFIRE. These data are classified using the NatureServe terrestrial ecological systems classification.

LANDFIRE Rapid Assessment VDDT models

These models were created to support the LANDFIRE rapid Assessment. This rapid assessment was superseded by the National LANDFIRE Assessment. However, these models are useful for understanding the dynamics of larger areas, and the common dynamics of similar community types.

The Nature Conservancy's VDDT models

The Nature Conservancy (TNC) offices in Nevada and Idaho have created a suite of VDDT models that reflect current vegetation. When appropriate, these models are built upon the foundation of the LANFDIRE models with the addition of current (typically anthropogenic) vegetative states and changes in disturbance regimes. When available, these will form a foundation for the VDDT modeling in this effort. These data are classified using the NatureServe terrestrial ecological systems classification.

Monitoring Trends in Burn Severity (www.mtbs.gov)

The monitoring trends in burn severity database provides maps of the burn severity and perimeters of all wildfires across all lands in the US for the period spanning 1984-2010. The MTBS is a multi-agency project to track trends in wildfire frequency, size, and severity. We also noted during AMT discussion that Landfire EVT and EV Height and EV Cover reflect early 2000s time periods. More recent wildfires can be depicted from burn perimeter data to update these layers. This is an ongoing effort of Landfire "refresh" but we will investigate status of these updates during Task 3.

The Fire Effects Information System (www.feic.gov)

The FEIC is a compendium of research reports and other publications relating the effects of fire on native plant and animal species, invasive species, ecological communities, and soils. The FEIC is a useful source for understanding fire effects on biodiversity, and for identifying parameter values for VDDT models.

Class II: Development

This CA class is very broad, encompassing several subclasses. Therefore, several data sets have been identified and evaluated to represent the development CA class. Two data sets were evaluated for summarizing overall human modification of the landscape. Both data sets model the influence of anthropogenic disturbance in the MBR but were developed at broader scales and incorporate many of the development subclasses synergistically. While assessments will include individual subclasses, we believe the use of these synoptic data sets will also prove informative and will be investigated in Task 3.

The first, (Leu et al. 2008) was developed by the USGS Snake River Field Station. The map focuses on shrubland ecosystems and combines models of habitat use by predators (ravens, crows) closely associated with human presence and the risk of invasive plant infestation (also closely associated with human presence) to estimate the total influence of human activities.

The second data set is the Natural Landscapes (NL) (Theobald 2010). NL is a multi-scale, integrated metric that incorporates national data sets on land cover, housing density, road existence, and highway traffic volume to measure the dynamics of natural landscapes in the conterminous U.S. The advantage of this is metric is that it provides a simple, robust measure of landscape dynamics that has a direct physical interpretation related to the proportion of natural habitat affected at a location. In addition it represents landscapes as a gradient of conditions rather than a predicated patch/matrix definition. Furthermore it

measures the spatial context of natural areas, incorporates land conversion, residential use, transportation infrastructure (including traffic or use), and resource extraction activities.

The NL metric is similar to other approaches that evaluate the effect of humans on natural landscapes such as the human footprint (Leu et al. 2008) in that it uses surrogate spatial data on land cover, population, and roads, as well as relying on heuristically derived estimates of human-dominated cover types. NL differs in that it is a simpler metric that has a direct physical interpretation related to proportion of natural cover at a location, examines the broader, landscape-scale pattern to differentiate the spatial context, and assumes that impacts decline continuously as a function of distance, rather than using abrupt ‘‘distance bands’’ or ‘‘buffers.’’ NL also does not rely on pre-established critical scales and avoids the persistent problem of the arbitrariness of defining a patch. As such, this latter database is recommended as a reference for human disturbance caused by development.

Beyond the spatial component of the CAs listed in this section, a temporal component will continue to be addressed. In AMT 2, we discussed the idea of classifying data into temporal scenarios: current or baseline, near-term future and long-term future. Over the course of task 3, data sets will be classified according to their potential applicability to certain scenarios.

Urbanization

The Integrated Climate Land Use System (ICLUS) project has developed national scenarios of housing density that are logically consistent with IPCC emissions scenarios. It uses a cohort-component methodology to represent population growth in the U.S. Spatial allocation is accomplished using SERGoM (Theobald 2005), a hierarchical (national to state to county), deterministic model that calculates the number of additional housing units needed in each county to meet the demand specified by population projections from the demographic model, based on the ratio of housing units to population (downscaled from census tract to block).

Housing units are spatially allocated within a county in response to the spatial pattern of land ownership, previous growth patterns, and travel time accessibility. The model is dynamic in that as new urban core areas emerge, the model re-calculates travel time from these areas. SERGoM was created using refined land ownership, transportation, and groundwater well density using 2009 data, and by weighting housing units by NLCD 2001 cover types (US EPA 2009; Bierwagen et al. in press).

Other data sets that are suggested for urban development include SILVIS housing density and LANDSCAN, but these are not based on open source demographic/population projections and do not include the detailed spatial data on land ownership, accessibility, and groundwater density to allocate housing units. For these reasons we only evaluated the ICLUS/SERGoM layer which we determined is adequate for use in the REA. The Desert Research Institue (DRI)’s alternative futures project for the Las Vegas Valley will be evaluated during the course of Task 3 for possible integration or to help validate the SERGoM models.

Infrastructure

Roads

The NOC is preparing a new product, the “linear disturbance” map that was developed at the BLM field office level. Data managers at the NOC have indicated that this will be the most detailed data set of roads and will be ready early in 2011. We will evaluate this data when available relative to whether it is desireable to complement it with the 2009 Tiger/Line shapefiles and National Transportation Atlas Database (NTAD).

Pipelines

The NOC has indicated that the BLM Linear Disturbance maps may contain pipelines at a fine scale. However if there discrepencies or gaps in the data set, NatureServe recommends an augmented National Pipeline Mapping System (NPMS) data set. This data set includes all major gas and hazardous liquid transmission for the MBR. We have reviewed the FGDC compliant metadata for this data set and

recommend it for use. Geospatial data regarding future pipelines in the MBR have been requested but not yet obtained.

Transmission lines

Transmission lines are another component of the BLM Linear Disturbance Maps. This data set will be fully evaluated for completeness and accuracy upon receipt. Other transmission lines data sets consist of market significant transmission lines. However useful, this layer unfortunately lacks smaller branch transmission lines that represent the bulk of transmission lines on the landscape. If the BLM Linear Disturbance maps lack this component, we will obtain more data sets from USGS SAGEMAP for review. Point locations of communications towers have been obtained and will be considered as a part of the transmission infrastructure. Extensive improvements to the electrical grid are plausible for the MBR to accommodate new renewable energy projects. To represent these changes we propose using the Section 368 corridor maps provided by West-wide Energy Corridor Programmatic EIS (DOE & BLM 2008). We will continue to examine other energy corridors relating to specific renewable energy sectors as we identify and evaluate them. In the recently published Mojave Desert Ecoregional Assessment (Randall et al. 2010) additional corridors and sources were identified. The project PI, Crist, is a member of the SPSG Environmental Data Task Force (EDTF) and will use this connection to obtain data on planned transmission corridors should they come available during the course of the project.

Water transmission

The USGS NHD layer has specific categories identifying canals, ditches and other artificial paths used for water transmission at a 1:24,000 scale. Querying this data set will create an adequate water transmission layer.

Railroads

Railroad networks are less spatially and thematically complex than roads. We recommend using the railroads layer from the National Transportation Atlas Database (NTAD) for the ecoregion if this information is not included in the BLM Linear Disturbance Maps.

Energy development

Renewable Energy Development

Wind

The BLM provided maps of pending, authorized and closed wind leases for the MBR. Also provided were the annual average wind resource potential maps at 50m height for the states of the MBR (NREL 1986). Produced by NREL, this data set from 1986 is being replaced by a high resolution wind resource map showing the predicted mean annual wind speeds at 80m height (AWS Truewind 2010). This new data set presents the most accurate picture of wind resource potential for the region. We have recently requested this data but it has not been received in time for this evaluation.

Solar

Pending and closed solar energy leases for the MBR were provided by the BLM. We recommend using the Solar Energy Study Areas that identify areas currently being evaluated in the Solar Energy PEIS (ANL 2009). Also available are solar energy resource maps which show direct normal solar radiation for areas of 1% and 3% slope (SUNY & NREL 2007). These will provide some indication of the areas most likely to be developed for solar energy, especially concentrated solar power facilities. The Solar PEIS shows the areas most likely to be developed in the short term.

Geothermal

We obtained from the BLM maps of producing and non-producing geothermal leases as well as a potential geothermal energy layer. From the Great Basin Center for Geothermal Energy we obtained operating geothermal plants and the map of Geothermal Favorability and Exploration Activity (Zehner et al 2009). The Geothermal Favorability map is not complete for the MBR but otherwise these data sets adequately show current and future siting of geothermal generators.

Extractive energy development (oil, gas)

The BLM provided maps of oil and gas leases and agreements for the MBR. Communication with the NOC has indicated that detailed oil and gas maps detailing well locations are pending. The EPCA Phase III Inventory GIS data files (DOI et al 2008) are recommended for evaluating areas likely to be impacted in the future by further extractive energy development. The detailed oil and gas maps and the EPCA will sufficiently depict the extent of this activity.

Hydrologic Change Agents

Groundwater withdrawals

Data on current intensities of groundwater withdrawals within the MBR will be assembled from data developed by the USGS for its Southwest Principal Aquifers (SWPA) study (Anning et al. 2009; McKinney and Anning 2009), specifically data on municipal and agricultural withdrawals, supplemented with published information from the included states (e.g., CDWR 2003; ADWR 2009). Projections of future intensities will build on the results of the assessment of future development, incorporating present estimates of the rates of municipal per-capita and agricultural per-acre consumptive use.

Altered Surface Flow Connectivity

Data on present surface flow connectivity within the MBR will be assembled from the U.S. Army Corps of Engineers National Inventory of Dams (NID), the download for which needs to be carried out by a governmental agency. At present we have no strong basis for projecting future dam distributions. However, in general the construction of dams is strongly disfavored at both the state and federal levels; if any changes take place in dam distribution they will likely involve the removal of dams, particularly ones with high hazard ratings. We will assess the changes to flow connectivity by examining the consequences to measures of stream network connectivity that would result from the removal of high-hazard dams, as identified in the NID.

Altered Surface Flow

Surface flow change can result either from changes in human withdrawals and return flows, or from climate change. Since all surface water rights are fully appropriated in the MBR, as they are throughout the arid west, we do not forecast changes in surface water withdrawals or return flows. As noted above, we will use the projections of future development as the basis for projecting future water demand for the MBR, and estimate the extent to which any increases in demand could be met through either surface or groundwater resources. We will also take note of published reports on potential inter-basin transfers (e.g., Deacon et al. 2007). We will carry out a separate assessment of the likely changes in surface hydrology (and groundwater recharge) resulting from climate change, as discussed elsewhere in this memo.

Mining

The BLM provided maps of solid mineral leases for the MBR. We also acquired a data set from the USGS Mineral Resource Data System (MRDS) of all mine sites and mine processing facilities for the ecoregion. The MRDS is largely derived from 7.5 minute USGS quadrangles; however, it is comprised of point data which does not reflect the surface disturbance spatial extent. We will need to identify another data set or model surface disturbance if we intend to identify the total surface footprint of mines and their supporting infrastructure. In Task 3 we will explore modeling the footprint by associating the point locations to "barren" land cover classes from 30 m land cover data or using them to derive a relative mining impact layer. Large active mines (e.g. open pit) mines may be detected with existing satellite derived LU/LC maps.

Military use/expansion areas

Geospatial data pertaining to impacts or management of natural resources on military reservations was readily available for several bases in the MBR, Fort Irwin and Twentynine Palms through the

Mojave Desert Ecosystem Program. Early in 2011, the final EIS for the Twentynine Palms expansion will be released with a preferred alternative. However, heavily disturbed areas on military reservations will likely need to be extracted from general land use/land cover maps such as the National Landcover Data set (NLCD) or NatureServe ecological systems map. Expansion areas for Fort Irwin and Twentynine Palms have also been obtained. The NOC has indicated that they have three military flight data sets (from the FAA): no-fly zones, low flying areas and flight paths. These three layers may approximate areas of elevated noise from aircraft and serve to identify incompatible use areas, specifically areas where the DOD may object to the development of wind turbines. However the correlation between these designated flight zones and disruptive elevated noise levels on species is somewhat tenuous. The AMT indicated that their primary concerns are the flight training areas and radar incompatibilitiy with renewable energy development. During task 2, a representative from Edwards AFB indicated that DOD is releasing spatially explicit guidelines for the development of renewable energy infrastructure. We will incorporate this data as it becomes available during task 3.

Air quality impacts (non attainment areas and dust)

We will use National Atmospheric Deposition Program (NADP) data on Nitrogen as a stand-in for all air pollutants that involve acid deposition and result in nutrient enrichment once buffered. We will use NHDPlus and USGS-Nitrogen Groundwater Risk data sets as cross-checks on the NADP regional estimates. We will use NADP data on Mercury as a stand-in for all air pollutants that can bio-accumulate and cause physiological or developmental harm.

Recreation (OHV use, other intensive recreation, land sales, etc.)

We recommend using modeled estimates of dispersed recreational use via a method documented in *Network and Accessibility Methods to Estimate the Human Use of Ecosystems* (Theobald 2008). This approach will be thoroughly reviewed and evaluated in Task 3 as well as data from BLM on recreation sites and managed areas. Pending review of these data sets we will provide a recommendation of the extent to which we can incorporate effects of site-based recreation. We evaluated the US Forest Service National Visitor Use Monitoring data set and determined that these data are not suitable to be used in the REA because there is no comparable data set on BLM, NPS, USFWS and other public lands. .

Refuse Management (landfills, sewage sludge disposal, nuclear disposal, etc.)

From the USGS SAGEMAP site, we obtained the locations of landfills and waste transfer stations in 11 western states. Data was obtained from state and federal agencies in GIS, tabular, and map format. The data is in point format and lacks the spatial extent of landfills. This has created a similar situation identified with the mine resource data- a lack of a total footprint area for each feature and likewise we will investigate modeling potential to represent this CA. Data for mining slurry lagoons has also been obtained from the NV Dept of Environmental Protection. Similar data has not been obtained yet from Utah, Arizona or California. Data regarding sewage sludge disposal, nuclear disposal, etc. have not been obtained.

Agriculture

Crops, orchards, irrigated pasture

A useful resource for evaluating agriculture at a fine scale is the USDA Common Land Unit, the smallest unit of land that has a permanent, contiguous boundary, a common land cover and land management, a common owner and a common producer in agricultural land associated with USDA farm program. However the Food, Conservation, and Energy Act of 2008 restricts access to this information to certain departments of the USDA. The alternative is the 2007 Agricultural Census of the United States (USDA 2007) which is only spatially explicit down to the county level or 1:21,000,000 which is too

coarse for the REA. We recommend that agricultural areas be identified through an existing raster data set such as NatureServe's ecological systems map which identifies these areas with a sufficiently high level of accuracy and precision. We did not identify any data and do not propose modeling of agriculture change in the future.

Exotic ungulate grazing

Wild Horses and Burros

Data exist to answer the Management Questions posed for management units at a relatively coarse scale. Although spatial data for Herd Areas (HA) and Herd Management Areas (HMA) boundaries are believed to be accurate, tabular data on wild horse and burro numbers are presented on an HMA or HA basis. In Nevada these areas range from 4,000 to more than 1,000,000 acres. Tabular data on wild horses and burros include numbers of each by HMAs and HAs for each FY from 2005-2009. The AMT recommended against using the tabular data due to concerns about the accuracy of this information. After discussing this CA with the AMT, we clarified that few assumptions can be made using the data as-is to answer questions about whether units are exceeding AUM. Instead we will answer questions about the location and the likely integrity changes to HAs and HMAs using them as assessment and reporting units.

Livestock

Spatial data provided by BLM for allotment and pasture (pastures are areas within allotments) boundaries are believed to be the most accurate available. Tabular data on livestock Animal Unit Months (AUMs) and season of use are being assembled from the Rangeland Administration System (RAS) by the NOC. NOC indicated that it is revising and quality-testing this data and that only some livestock data will become available in an appropriate time frame (species of grazer (e.g. sheep or cattle) and permited AUMs at each allotment).

Drs. David Pyke and Cam Aldridge of the USGS are currently leading an effort to improve accuracy of the BLM allotment data in the Western US. However this data may not extend into the Mojave Basin and may not be available to incorporate in a timely fashion.

Authorized use data adjusted for actual use, spatial and temporal variation, and monitoring data would be at a coarse scale. The effects of livestock would need to be analyzed over the extent of the allotments boundaries, which range up to thousands of acres in size. Authorized use data could be adjusted for 1) actual use based on billing records for each allotment, 2) spatial and temporal distribution within allotments based on textual information contained in ten-year and annual grazing permits and permit decisions, and 3) actual use based on monitoring data. This information would need to be assembled from BLM field offices and is beyond the REA scope.

As with wild horses and burros, the current data is insufficient to draw conclusions about appropriate AUM so we will likewise treat grazing allotments as assessment and reporting units only.

The AMT expressed interest in artificial water source locations for stock and wildlife. The field offices are currently gathering this data in the field but it will not be available during the REA timeframe. Ecoregion-wide data on illegal grazing on allotments or feral cattle grazing are unavailable.

Class III: Invasives

Terrestrial Invasive Species

We have an adequate picture of most of the terrestrial invasive species through point observation data sources. We will be able to augment that with a model of the extent of invasive exotic grasses distributions. We still need to evaluate the large body of weed data provided by the BLM. Following are details about the data sets we have identified.

Comprehensive mapped data on terrestrial invasive species are non-existent for the ecoregion. Given the diversity and abundance of weeds in this ecoregion, this is no surprise. We do anticipate organizing

weed species as assemblages, i.e., annual grasses, perennial grasses and forbs, etc.; in order to amass sufficient sample data for modeling of units that are meaningful for addressing management questions.

We have located a few data sets that cover a small area (Clark County, NV) for many species, and a few data sets that cover larger area for single species (namely cheatgrass and tamarisk). For covering cheatgrass (*Bromus tectorum*) we have three sources. The Annual Grass Index (Peterson 2006) used Landsat data from 2004 for Nevada (which was based on training data and is predominately *Bromus tectorum* but also included *Bromus arvensis, Poa bulbosa, Taeniatherum caput-medusae, Vulpia microstachys,* and *Vulpia octoflora*). The *Bromus tectorum* Estimated Percent Cover Model (Peterson 2003) estimated cover from satellite imagery in April and June 2001. In addition we have the 2,325 survey points of *Bromus tectorum* presence/absence from 2004 & 2006 (Bradley and Mustard 2006).

The Southwest Exotic Plant Mapping Program (SWEMP) has >23,880 records that coincide with the terrestrial invasive species change agent list for the Mojave Basin. These are point location data that need further data management in order to evaluate fully.

Count	Scientific_Name
866	Acroptilon repens
1273	Alhagi maurorum
1269	Brassica tournefortii
1216	Bromus rubens
9092	Bromus tectorum
376	Centaurea melitensis
305	Eragrostis curvula
1601	Erodium cicutarium
596	Lepidium latifolium
6289	Pennisetum ciliare
999	Pennisetum setaceum
3	Phoenix dactylifera

We still lack ecoregion wide data for *Salsola iberica,* and *Schismus* spp.

The Weed Sentry data base (Abella et al. 2009) has point locations within Clark County, NV which has survey data for 82 species, most of which are non-native invasive species, but a few are native and even rare plants. The database has a total of 16,127 point locations. The NOC recently provided a weed infestation map with 6,226 polygon locations in the MBR. This layer is currently undergoing evaluation but certainly provides a valuable resource. The Arizona Natural Heritage program has also provided point location exotic species data.

For *Tamarix* we have the Colorado River Basin Tamarisk and Russian Olive Assessment data (Tamarisk Coalition 2009). This database is a compilation of many sources, and covers all of the major rivers and tributaries in the Mojave Desert Basin.

Additional sources of data on invasive species locations occur in the SWReGAP, CAGAP and LandFire databases. These sources have geo-referenced points that include exotic species such as tamarisk (*Tamarix*), Russian olive (*Elaeagnus angustifolia*), cheatgrass (*Bromus tectorum*), peppergrass (*Lepidium*) and others. In addition these data contain geo-referenced points representing exotic vegetation types, for example "Introduced Riparian Vegetation" and "Exotic Annual Grassland". The geographic extent and abundance of exotic species point locations in these databases needs to be evaluated. The ability to use the points for exotic vegetation types in Climate Change scenarios also needs to be evaluated. These data sources are also listed as data sources in the CE section (above), and can be located in the list of CE data sources, Appendix 1.

We searched for mapped invasive species data from the Extension Service with University of Nevada, University of Las Vegas, Utah State University, and the University of Arizona to no avail. We

also checked with state and private herbaria and Natural Heritage programs. State weed councils (CA, AZ, NV, and UT) have abundant information defining noxious or invasive plants and status ranks (how aggressively "invasive" a species may be). But specific location and mapped data was not available through these sources.

A component of the USGS Human Footprint map (Lue et al 2008) includes an exotic plant invasion risk model that predicted the potential spread of exotic plants according to anthropogenic features. This will be evaluated as a potential resource for modeling potential spread in Task 3.

Aquatic Invasive Species

Unlike many ecological and environmental databases (e.g. real-time weather data); current, complete, and verifiable site location databases of aquatic invasive species are dependent on timely observation and reporting by qualified biologists or taxonomists. There are often large lag times between when a private citizen, researcher, or manager observes an aquatic invasive species, when it is reported to the appropriate agency, and when it is verified and entered into a useable database. There are also large differences in observational and survey effort between water- body types. Invasive species are more likely to be reported and monitored in easily accessible or popular fisheries than in other locations. Isolated remote small springs/seeps are seldom visited; unless they provide known habitat for a listed native species. In such remote springs/seeps, an invasive species could go unreported for many years or even decades. Detectability and recognition of invasive species is also problematic. Most private citizens and many biologists are unfamiliar with invasive species identification or may assume that an invasive species is native. Invasive species may also be cryptic, highly evasive, or occur at low or undetectable densities, further reducing timely verification and reporting. Finally, monetary funding for surveys and compiling databases of invasive species is lacking.

The most comprehensive available databases on aquatic invasive species are maintained by the USGS Nonindigenous Aquatic Species (NAS) Program. These databases contain high quality point or HUC locations and brief descriptions for the majority of invasive species that were selected as representative change agents (CA) in the ecoregion. However, the USGS NAS databases are not exhaustive and additional databases have been selected to complement or supplement these databases. These include the Montana State University New Zealand Mudsnail in the Western USA database (which includes reported locations in our ecoregion) and a USGS Fort Collins, CO database containing locations of known *Didymosphenia geminata* (didymo) locations in our ecoregion. Dr. Sarah Spaulding, USGS, Fort Collins, CO, has provided NatureServe and BLM with known locations of didymo in the western USA, as of 2007. She also has additional didymo locations that have been reported since 2007 but the data is not in a useable format. Since didymo is rapidly spreading throughout the western USA, the acquisition of the most recent data is critical in order to evaluate its spread. Dr. Spaulding is willing to compile the most recent data into a useable format for BLM and NatureServe pending funding. NatureServe has contacted Dr. Spaulding and asked her for a one to two page summary of her database, the amount of funding she is requesting, and an estimated delivery date. We will provide this information to the NOC when we receive it from Dr. Spaulding.

In addition, we are in the process of obtaining an extremely useful database from the Desert Research Institute, Reno, NV. Dr. Don Sada of DRI has collected data from more than 2000 springs in the desert southwest including BLM's Mojave and Central Basin and Range ecoregions. This database includes endemic and invasive macroinvertebrate and fish locations and environmental variables associated with these taxa. Many of the springs have never been sampled or the historic data are outdated. Dr. Sada is willing to compile most of the data into a useable format for BLM and NatureServe pending funding. NatureServe has contacted Dr. Sada and asked him for a one to two page summary of his database, the amount of funding he is requesting and an estimated delivery date. We will provide this information to the NOC when we receive it from Dr. Sada.

Also, most of the state fish and game departments and state and federal water quality monitoring program databases that we are using in the aquatic Conservation Elements analysis also contain data on aquatic invasive species. For example, US EPA National Lake Assessment, Nevada Division of Environmental Protection Bureau of Water Quality Planning, and Utah State University-Western Center for Monitoring & Assessment of Freshwater Ecosystems databases are being utilized in the aquatic Conservation Elements analysis and will also be used in our aquatic invasive species Change Agent analysis. However, state and federal water quality data sampling and collection methods are not specifically focused on invasive species and may overlook or under represent invasive species locations.

Class IV: Climate change

NatureServe will carry out assessments of the potential impacts of climate change on both terrestrial and aquatic-riparian CEs. Due to differences in some of the data to be used, these two assessments will be conducted in parallel rather than as part of a single assessment.

Datasets available for climate change effects modeling are divided into two categories: current and future time periods. The BLM recommended dataset for analyzing current climatic patterns is the Parameter-elevation Regressions on Independent Slopes Model (PRISM) dataset (Daly et al 2002), which is widely recognized as the most accurate spatial climate dataset available within the domain of the conterminous U.S. PRISM is currently the official climatology of the U.S. Dept. of Agriculture. Future climate change effects will be modeled using dynamically downscaled model outputs generated by the USGS (which we were not required to evaluate for Task 2). Factors in these current and future spatial climate datasets relevant to the objectives of the MBR REA include the spatial resolution of the available data, the temporal extent of available records to analyze recent historical climatic variability, the climate parameters available in the current as compared to the future, the temporal resolution with which these current and future climate variables have been measured (i.e., daily, monthly, etc.), and the degree of uncertainty that remains based on the limited number of future climate datasets available for climate change effects modeling.

PRISM is available at several spatial resolutions. The finest resolution for the freely available PRISM dataset is a 2.5 min grid (4km). While higher resolution spatial climate information is always desirable given that plants and animals interact with climate at relatively fine spatial scales, the 4km spatial scale of the PRISM data is an appropriate resolution for the suite of climate change effects analyses that will be conducted for the MBR REA (see addendum below). The future climate models to be obtained from the USGS are produced at 15km grid resolution – significantly coarser than the 4km PRISM data for current climate. It must be recognized that any current climate analyses or current species distribution models will be produced at a finer resolution than equivalent future analyses, as an unavoidable limitation of the coarser resolution climate model outputs. This tension between the finer resolution of current climate datasets and the coarser resolution of global climate models is longstanding, and it will likely be several decades before global or even regional climate models can produce native outputs at sufficiently fine spatial resolution for detailed ecological impacts analyses. The availability of multiple dynamically downscaled climate model outputs for impacts analyses is unprecedented, and it represents a huge advance over the far more prevalent and simplistic statistically downscaled climate model outputs currently in use for most all ecological forecasting efforts.

The first task in the MBR REA climate change effects modeling for terrestrial ecosystems is to quantify observed historical climatic variability for the distribution of major CEs across the ecoregion. The results of this analysis will be highly dependent on the availability of long term reliable climatic records. In this regard, the PRISM dataset is highly appropriate and will perform well (see addendum below). PRISM currently offers monthly climatic variables dating back to 1895 that have been vetted and published (Daly et al 2002; Gibson et al 2002). This represents a time series sufficiently long to capture

climatic variability caused by decadal-range oscillation patterns such as ENSO (El Nino – La Nina cycles).

There is a significant difference in the climate parameters available in the PRISM dataset for the present, and the very large number of climate and biophysical variables archived from the dynamically downscaled climate model outputs. PRISM offers only monthly measures of: maximum temperature, minimum temperature, total precipitation, and dew point temperatures. Over 70 climatic and biophysical variables recorded at 3 hourly and 6 hourly intervals are produced by the dynamical models generated by the USGS. As of this writing, we have received significant new information about the climate model dataset that will help determine the specific variables we will request for climate change effects modeling. At a minimum, the same four parameters available in PRISM averaged into monthly time steps will be requested. In addition, the 3-hourly and 6-hourly model outputs will allow an analysis of extreme temperature and precipitation events as produced by the regional climate model outputs. Extreme events are very important drivers of climate impacts on plants and animals. We are currently contributing to a multi-REA working group to establish a clear path forward on this front.

Finally, the evaluation of the degree of uncertainty in climate-driven future ecological impacts is limited by the number of available climate model outputs. At this stage, we know we will have either 3 or 4 independently generated climate model runs. Each run represents 3 or 4 global circulation models that are used as boundary conditions to feed a single regional climate model, all of which are run under a single scenario of future greenhouse gas emissions. While, as stated earlier, it is unprecedented to be conducting ecological impacts analyses with multiple dynamically downscaled climate model outputs, it must be recognized that these data still represent a relatively small sampling of future climate space. The degree of uncertainty can be evaluated by the degree of model agreement across these 3 to 4 independent model outputs, but in cases where there may be relatively little agreement, climate driven ecological impacts may remain somewhat uncertain.

Alternative Climate Data for Climate Change Effects Assessment

Measuring impacts of climatic change requires an understanding of the current climates to which target conservation elements are adapted. Weather station data providing specific measurements of localized climates has only been available for about the last century, and only in the last 50 years or so has the density and quality of weather station data been sufficient to produce region-specific 'normal' climatologies. The PRISM group at Oregon State University has generated decadal averages monthly temperature and precipitation for the conterminous U.S. from the 1890's to the present day at a resolution of 4km. These are the BLM-recommended climate data for characterizing current climates in the ecoregions under assessment.

However, the influence of climate change on species distributions and interactions is likely to be mediated by microclimatic patterns, just as the fine scale patterns of current species distributions are also strongly influenced by microclimate. Climate data that more accurately reflect microclimatic features such as cool air drainage down valleys, or temperature and precipitation differences on north vs. south facing slopes, will offer a better understanding of how future climatic changes might influence conservation elements.

The PRISM group has generated a time-series climatology for the conterminous U.S. at 800m resolution. Acquisition of this dataset, which would cost roughly $5000-7000, would allow 1) a characterization of historical climate normals at a spatial scale that more closely approximates how plant and animal species interact with local climates, and 2) the analysis of climate anomalies (also called "departure analysis"), that is, a measure of the magnitude and directionality of climatic changes already observed, at fine spatial scale. In addition, the 800m PRISM dataset is considered a more accurate product, even though it requires additional interpolation. In tests comparing the two climate datasets for the 10 counties around the San Francisco Bay Area, CA, significant errors were encountered in the 4km as compared to the 800m in several mountainous areas (D. Ackerly, personal communication, Nov 2010).

The 800m PRISM data will be particularly useful in conjunction with the future climate model outputs of the Flint and Flint (2007) Basin Characterization Model (see below) that has been driven with the GFDL and PCM climate models under the A2 and B1 emissions scenarios. The Flint and Flint future climate datasets are produced at a spatial resolution of 270m that incorporate 4km downscaled climate data with finer-resolution data on topography, soils, and vegetation. Together, a characterization of climate norms at 800m and climate futures at 270m would result in climate impacts analyses using the very best possible spatial climate datasets available.

The PRISM 800m spatial climate data is available now for purchase from the PRISM group at Oregon State University. Because the dataset covers the entire lower 48 states, a single purchase will serve climate analysis for all ecoregions outside Alaska and Pacific Islands.

Climate-Hydrologic Effects Assessment

We will also assess the impacts of climate change on aquatic coarse-filter CEs. The USGS has developed data to assess the likely impacts of climate change on the watershed hydrology of large areas of the southwestern US. This work has been conducted by Flint and Flint, and incorporates the Basin Characterization Model (BCM) methodology that they developed to assess the impacts of historic-to-current climate variation on watershed hydrology (Flint and Flint 2007). They used the 4-km PRISM dataset as their historical reference for precipitation and max and min air temperature. Using these 4-km data, they ran their BCM historically for the interior desert southwest (1940-2007) and for California (1895-2009). The model produces output at a 270-m grid resolution for monthly precipitation, max and min air temperature, potential evapotranspiration, actual evapotranspiration, excess water, snow accumulation and melt, sublimation, soil storage, recharge, runoff, climatic water deficit. This study (Flint and Flint 2007), with its 270-m grid resolution, provides crucial information for the assessment of current condition and ecological integrity for aquatic coarse-filter CEs. Importantly, its fine spatial resolution makes it possible to aggregate the BCM output data effectively by 5- or 6-field HUC and link the BCM output to NHD data layers.

The data from the Flint and Flint (2007) study have already been made publicly available. Additionally, we would like the BLM to be aware that the Flint and Flint team could run the same analyses on other ecoregions.

The Flint and Flint team further, as noted above, has applied their BCM methodology to climate data downscaled to 4 km and incorporated into a dataset with the same 270-m grid resolution. Lorraine Flint (personal communication 10/15/10) has stated that their team has downscaled and bias-corrected four climate future scenarios, using the PCM and GFDL climate models coupled to the A2 and B1 greenhouse gas emissions scenarios for the continental US, resulting in precipitation and maximum and minimum air temperatures again at a 4-km grid resolution. The Flints have used their BCM model to calculate local climate and watershed condition variables at the 270-m scale for the same Great Basin and California domains, again resulting in monthly estimates for each parameter. Unfortunately the USGS presently does not have funding to complete all four climate futures analyses for their Great Basin domain, which includes portions of the MBR; they have so far completed only the GFDL-A2 analysis for this domain, although they have completed all four analyses for California alone. They presently anticipate having the resulting five output datasets available for public use "by this winter." They would need funding to run PCM-A2, PCM-B1, and GFDL-B1 for the interior southwest on our REA timeframe. (They would also need funding to run both their historic and GFDL-A2 models for the portions of CBR that their domains do not presently cover, but this is not the ecoregion of interest in this present Memo).

There are four other factors to consider, with respect to the potential costs versus benefits of having the USGS complete its planned climate futures analyses, and filling in the orphaned areas of the MBR for historic conditions:

1. The only climate future scenario available from the Flint and Flint team for the MBR is the GFDL-A2 model. This is only one of many climate future models, and may not produce results consistent with other down-scaled models. The down-scaling methodology used by the Flint and

Flint team also is not a dynamic methodology, and so their results may not be fully comparable to those produced by the Hostetler team. On the other hand, the 15-km scale of the Hostetler team output lends itself poorly to aggregation at the HUC scale or linking to NHD data layers, for analysis of aquatic coarse-filter CEs.

2. Any new runs by the Flint and Flint team will result in what the USGS officially designates as "preliminary" data. Such preliminary data cannot be released to the public until fully reviewed by the USGS, but can be released to any client that has actually contracted for the study. So, if the BLM were the client, the Flints could provide them with the preliminary data in advance of public release, and the BLM would then be able to share the data with us and other REA contractors.
3. There is a fair amount of serious data management involved in working with the USGS BCM output, because the datasets are so huge. The Flint and Flint team is willing to help with that, but it would be better if a client could help with funding.
4. Finally, the Flints have expressed interest in completing their BCM modeling for other ecoregions. Lorraine Flint (personal communication, November 2010) has stated that it would take them "about a month" to do each additional ecoregion that the BLM might request, both the historic and the future scenario runs. This clearly does not affect MBR, but could be valuable for future REAs. Running the BCM for additional ecoregions under a "client" relationship with the BLM would, as noted above, make the results of these additional runs available more rapidly for REA purposes.

Data Evaluation Results for Managed Lands and Sites

We refer to these classes as *Places,* being neither a CE nor CA; thus the PL abbreviation below.

PL Class I: Sites of High Biodiversity

Areas of High Biodiversity are represented by previous analyses characterizing locations with concentrated at-risk biodiversity or locations where a prioritization exercise has identified areas of high conservation significance. Criteria for previous prioritization exercises vary, and those variations can reflect on their suitability for the REA. This class may overlap spatially with the subsequent two PL classes (II and II) but they differ in that the latter categories include established legal boundaries for land and water units (e.g., ACECs). Areas of high biodiversity significance most frequently imply more flexible boundary definition and suggest the need for future field verification prior to settling upon new legal or management designations.

Crucial habitats, as defined through the Western Governor's Association (WGA) Western States Decision Support System (DSS) efforts, often fall into this category. We have yet to evaluate these data (e.g. the "Conservation Guide" map for AZ); as they will become available through the Southwest DSS effort.

Ecoregional assessments (ERAs) conducted by The Nature Conservancy (TNC) have historically included the identification of priority conservation areas. These "portfolio sites" equate with area of high biodiversity sites. The primary TNC effort of this nature for the MBR includes their Mojave Desert assessment (Moore et al. 2001), but adjacent assessments include sites that overlap the MBR boundaries. By compiling information on "coarse-filter" and fine-filter CEs, evaluating their condition, establishing representation goals, and factoring in existing protected areas ERAs identified an efficient land allocation to achieve the stated representation goals. NatureServe has acquired the entire U.S. data set from TNC to represent these sites in the REA. We recommend using these site boundaries as a potential spatial reporting unit for this REA. Two additional data sources in this category include Important Bird Areas (IBA), identified by Audubon and by the American Bird Conservancy. In many instances, the IBAs were

already factored into previous TNC assessments. However, as we acquire these data, we will deterimhne their relative applicability to this REA.

More recent updates by TNC (Randall et al. 2010) provides an updated perspective from TNC, but instead of taking the previous "portfolio" approach, categorizes the entire ecoregion in terms of several categories of "Conservation Value" (including "ecological core" "ecologically intact" "moderately degraded" and "highly converted" categories). We recommend review of these data, along with output from the SW DSS effort, during Task 3 of this REA, to determine their appropriate use for BLM purposes.

PL Class II: Specially Designated Areas of Ecological or Cultural Value

Many of these areas are special classifications of BLM and US Forest Service lands: wilderness areas, wilderness study areas, and the Mojave National Preserve. We will also take into account unique BLM lands distinctions such as Areas of Critical Environmental Concern (ACEC). By their special nature, USFWS National Wildlife Refuges and National Parks are also included in this category. All of this data is best represented in the Protected Area Database of the U.S. (PADUS) version 1.1 which has been obtained and evaluated. This data set will be verified against the BLM Surface Management Agency (SMA) maps.

PL Class III: Other Managed Lands

Other managed lands include the majority of the area of federal or state managed lands in the MBR characterized by management for multiple uses. These data are spatially represented by the PADUS. The AMT has requested that we use BLM's SMA maps provided by the NOC to identify all managed lands.

Summary Data Gaps and Recommendations for CEs, CAs, PLs, and MQs

We summarize the key data gaps and revisions by REA component:

CE Data Gaps and Recommendations

Although we are still in data discovery, it is unlikely that there will be substantial data gaps for Conservation Elements in the REA. As noted throughout the sections above, considerable effort is needed to combine and rectify existing data sets to meet the needs for the REA. At this time we do not recommend any changes to the proposed conservation elements.

Table 1. Summary of data suitability for CEs.

Conservation Element Category	Number of Elements	Data Suitable?
Basin Dryland Ecosystems	10	high probability
Montane Dryland Ecosystems	3	Yes
Basin Wet Ecosystems	8	high probability
Montane Wet Ecosystems	1	Yes
Nested Terrestrial Habitat-Based Species Assemblages	TBD	high probability
Nested Aquatic Habitat-Based	TBD	high probability

Conservation Element Category	Number of Elements	Data Suitable?
Species Assemblages		
Individual Species	TBD	high probability
Desired Conservation Elements		
Sensitive Soils		TBD

CA Data Gaps and Recommendations

Sufficient comprehensive data sets exist to model the Wildfire and Climate Change classes. For other CAs, there are critical data gaps that will require additional research and AMT guidance.

Table 2. Summary of data suitability for CAs.

Change Agent Class	Number of Subclasses	Data Suitable?
Wildfire	2	Yes
Development	10	Variable
Invasives	2	Variable
Climate	TBD	Yes

Managed Lands Data Gaps and Recommendations

We will need to evaluate the Crucial Habitats data from the Southwest States DSS project when it is available. The AMT noted that areas of biodiversity significance identified in BLM resource management plans will not be available to incorporate. This data has not been compiled from the field offices.

Recommendations for Management Question Revisions

Treatment of individual management questions (MQs) is described in Appendix IV. Generally, data appears available and suitable to answer most of the MQs, although several data sets are yet to be acquired and evaluated. Further acquisition and assessment of data is needed and the ability to assess the MQs through models will be treated in Task 3. Table 3 below summarizes MQs or categories of MQs that are or may be impacted by data availability.

Table 3. Summary of data suitability for MQs.

Management Question	Issue/Recommendation
MQs involving species movement corridors	Corridor data availability and suitability uncertain to answer corridor questions
MQs involving climate change	Large differences in climate change data resolution may impact ability to deliver products at desired resolutions

Management Question	Issue/Recommendation
MQs involving exotic grazers	Data on actual distribution of grazers non-existent or inadequate to answer questions requiring such data. Drop MQs related to these parameters.
Of these water resources, what is their surface water/groundwater connectivity?	Not directly measurable at regional scale; we will use surrogates (see memo Appendix IV
What is the natural range of variation in high and low water levels or flows (e.g., frequency, timing, duration of high and low water levels or flows)?	Not directly measurable at regional scale; we will use surrogates (see memo Appendix IV
What is the current distribution of invasive species included as CAs?	Most data are highly localized or state-level and will likely require modeling for many species
Where are areas of planned or potential development (outside of current urban areas)(e.g., under lease, plans of operation, governmental planning), including transmission corridors?	Development plans of private industry not readily available unless already in NEPA process
Where are areas with groundwater resources available to sustain renewable energy projects that would not degrade aquatic ecosystems that also depend on these groundwater resources.	This may be too fine-detailed a question to be answered with a REA. See Mem 2 Appendix IV for details and suggested approach
Where are areas under leases of water rights?	We have not identified a consistent set of data with which to assess the spatial distribution of either surface or ground-water use rights, and will need to clarify with the BLM what is needed here.
Where are artificial water bodies including evaporation ponds, etc.?	Not sure how we would distinguish "artificial" except as impoundments behind dams (US Army Corps NID)
Where are the areas showing ecological effects from existing surface water exploitation?	We have to rely on comparisons of historic published records (rather than GIS data) on the distribution of perennial flows and perennial water levels in springs, to records of their distribution today; we have not identified GIS data layers for this purpose.
MQs dealing with military use and constraints	We will address how available military restricted areas may affect energy development but will not address questions related to noise impacts.

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Appendices

Appendix I: Master Data Table for the Mojave Basin and Ranges REA

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CE Class I Terrestrial Coarse Filter	California ReGAP Land Cover	in review	CA ReGAP Land Cover of terrestrial ecological systems and land cover, circa 2003, released in 2009	Lennartz, S., et al., 2008. Final Report on Land Cover Mapping Methods for California Map Zones 3, 4, 5, 6, 12, and 13.	accepted	USGS	Yes	CE models of current distribution within CA	Good for use in combination with other sources for CE distribution models
CE Class I Terrestrial Coarse Filter	NWReGAP Land Cover	review not needed	existing land cover that would cover extreme southern NV portion of Central Basin and Range ecoregion		rejected	USGS	Yes	CE current distribution	has already been incorporated into composite map coverage to be used
CE Class I Terrestrial Coarse Filter	SWReGAP Land Cover	review finished	Land Cover map of NV, UT, AZ, UT, CO, and NM, based on NatureServe ecological systems classification; circa 2001.	Lowry, J. R.D. Ramsey, K. Thomas, D. Schrupp, T. Sajwaj, J. Kirby, E. Waller, S. Schrader, S. Falzarano, L. Langs, G. Manis, C. Wallace, K. Schulz, P. Comer, K. Pohs, W. Rieth, C. Velasquez, B. Wolk, W. Kepner, K. Boykin, L. O'Brian, D. Bradford, B. Thompson, and J. Prior-Magee. 2007. Mapping moderate-scale land-cover over very large geographic areas within a collaborative framework: a case study of the Southwest Regional Gap Analysis Project (SWReGAP). Remote Sensing and Environment 108: 59-73.	accepted	USGS	Yes	Current terrestrial coarse filter CE distribution.	already included as part of NatureServe 2009 map
CE Class I Terrestrial Coarse Filter	Terrestrial Ecosystems of the Conterminous United States	review finished	The U.S. Geological Survey (USGS) modeled the distribution of terrestrial ecosystems for the contiguous United States using a standardized, deductive approach to associate unique physical environments with ecological systems characterized in NatureServe's terrestrial ecological systems classification. this map depicts predicted biophysical settings that might support each ecological system type; regardless of current land use/land cover.	Sayre, R., P. Comer, H. Warner, and J. Cress. 2009. A new map of standardized terrestrial ecosystems of the conterminous United States: U.S. Geological Survey Professional Paper 1768, 17 p.	accepted	USGS	Yes	For use as biophysical setting representing terrestrial coarse filter CEs	This data layer best suited to applications at multi-ecoregion-national scaled analysis. More precise and accurate data sets exist, and/or may be readily combined to serve intended purposes for these REAs.
CE Class I Terrestrial Coarse Filter	The Human Footprint in the West	in review	Map of the human footprint for the western United States from an analysis of 14 landscape structure and anthropogenic features.	Leu, M., Hanser, S.E., Knick, S.T. 2008. The Human Footprint in the West: A Large-Scale Analysis of Anthropogenic Impacts. Ecological Applications 18: 1119-1139.	(empty)	USGS	Yes	Characterizing current condition of terrestrial CEs	Likely suitable. Will be investigated along other modeling options in Task 3.
CE Class I Terrestrial Coarse Filter	LANDFIRE Biophysical Settings	review finished	The Biophysical Settings (BpS) layer represents the vegetation that may have been dominant on the landscape prior to Euro-American settlement and is based on both the current biophysical environment and an approximation of the historical disturbance regime. http://www.landfire.gov/version_compar	http://www.landfire.gov/NationalProductDescriptions20.php	accepted	USFS LANDFIRE	Yes	Assessment of long-term trends in extent for Coarse-filter CEs; assessment of fire regime departure	Moderate to high, with additional review and potential refinement. Will be brought together with NRCS Ecological Site Descriptions/soil-based maps.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
			ison.php						
CE Class I Terrestrial Coarse Filter	LANDFIRE Existing Vegetation Type	review finished	The Existing Vegetation Type (EVT) layer represents the vegetation currently present; as defined by NatureServe terrestrial ecological systems classification (with some modifications). http://www.landfire.gov/NationalProductDescriptions21.php	http://www.landfire.gov/NationalProductDescriptions21.php	accepted	inter-agency LANDFIRE	Yes	use in combination with ReGAP-based NatureServe land cover sources to refine ecoregion map of CE distribution and condition	Suitable for this purpose; error in sample plot attribution intriduced error into these EVT maps. These were very early LANDFIRE map zones.
CE Class I Terrestrial Coarse Filter	LANDFIRE Reference Vegetation Data	review finished	Georeferenced & labelled samples of vegetation gathered by Landfire to use as training data for their mapping & modeling efforts. Each sample is labelled with an ecological system. Includes species composition & cover, structural variables, some disturbance information, and calcualted fuels data. Environmental data (elev, aspect, slope, soils, etc) are not included.	LANDFIRE Reference Database - Overview http://www.landfire.gov/NationalProductDescriptions27.php General Technical Report RMRS-GTR-92: Integrating Ecosystem Sampling, Gradient Modeling, Remote Sensing, and Ecosystem Simulation to Create Spatially Explicit Landscape Inventories	accepted	LANDFIRE	Yes	Input for spatial models of current distributions scenarios	High; but label errors between ReGAP and LF labeling detected, and will be reassessed for project uses.
CE Class I Terrestrial Coarse Filter	NatureServe Terrestrial Ecosystems and Land Cover	review finished	Composite national map combining and reconciling ReGAP map products in the SE, SW, and NW with LANDFIRE EVT nationally. Review, editing, and documentation completed by NatureServe. Includes imbeded thematic links to US-NVC, NWI, NLCD, and other land cover classifications.	NatureServe. 2009. Terrestrial Ecological Systems of the Conterminous United States. Version 2.7. Completed in cooperation with USGS Gap Analysis Program and inter-agency LANDFIRE. MMU approx. 2 hectares. NatureServe, Arlington, VA, USA. Digital map.	accepted	USGS GAP, LANDFIRE, NatureServe	Yes	Current distribution of terrestrial CEs	Suitable for this use, with additional review and refinement
CE Class I Terrestrial Coarse Filter	NatureServe Landscape Condition	in review	NatureServe Level I (remotely sensed/modeled) measure of current condition/integrity for terrestrial CEs	Comer, P.J. & J Hak. 2009. NatureServe Landscape Condition Model. Technical documentation for NatureServe Vista decision support software engineering. NatureServe, Boulder CO.	accepted		Yes	For overlay with current CE distributions to gauge current ecological integrity, and as a 'resistance surface' for modeling landscape connectivity for CE distributions.	Highly suitable for certain CEs; can be updated and refined easiliy with local data.
CE Class I Terrestrial Coarse Filter	SageMap	in review	2002 integration of classification and available map data to depict sagebrush and related vegetation across the inter-mountain West.		rejected	USGS		For evaluation and refinement of composite map of current CE distributions.	suitable for use
CE Class I Terrestrial Coarse Filter	Ecological Integrity Criteria	in review	Descriptive text, metrics, and thresholds for gauging ecological integrity of examples for upland and wetland ecological systems. These reflect 2008 standards established by NatureServe		accepted	NatueServe		For use in conceptual and spatial modeling of integrity for coarse filter CEs	suitable for selected types

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CE Class I Terrestrial Coarse Filter	NatureServe Element Occurrence Ranking Criteria for Ecological Systems	in review	Criteria to rank occurrences for ecological integrity, based on NatureServe 2000 data standards.		accepted			Input to conceptual models of ecological integrity for coarse-filter CEs	suitable for use
CE Class I Terrestrial Coarse Filter	Landfire Rapid Assessment models	in review	These are models created during the LANDFIRE rapid assessment stage. These models, by and large, have been superceded by the LANDFIRE national models. However, they are valuable for reference			Interagency: the USFS is the lead Agency		For input to refinement of existing conceptual models	suitable for this use
CE Class I Terrestrial Coarse Filter	Humboldt-Toyabe NF Existing Vegetation	need to review	existing vegetation maps by FS district (15 maps)	various		Forest Service		review and refinement of ecoregion-wide EVT map	will review during Task 3
CE Class I Terrestrial Coarse Filter	Great Basin Integrated Landscape Monitoring - NatureServe BpS model	review not needed	Using USGS national 'footprint' inputs (bioclimate, landform, surficial lithology) we completed a series of new maps through inductive modeling, using subsets of available sample data to simulate alternative mapping approaches given varying quantities of availability for georeferenced samples.	Comer, P.J., J. Hak, and G. Mendiguran. 2009. Alternative Methods for Mapping Terrestrial Ecosystems in the Great Basin of the Western United States. Report to the U.S. Geological Survey. 37 p.	accepted	NatureServe	Yes	for review and refinement of Landfire BpS maps	suitable for use
CE Class I Terrestrial Coarse Filter	SW-ReGap - Land Cover Field-Based Map Training Points	in review	This database represents the training point and quality control check for training site data collected in the landcover mapping effort for the Southwest Regional GAP Analysis Project. Field surveys were conducted between 2002 and 2004 throughout the region.	Lowry, J. H, Jr., R. D. Ramsey, K. Boykin, D. Bradford, P. Comer, S. Falzarano, W. Kepner, J. Kirby, L. Langs, J. Prior-Magee, G. Manis, L. O'Brien, T. Sajwaj, K. A. Thomas, W. Rieth, S. Schrader, D. Schrupp, K. Schulz, B. Thompson, C. Velasquez, C. Wallace, E. Waller and B. Wolk. 2005. Southwest Regional Gap Analysis Project: Final Report on Land Cover Mapping Methods, RS/GIS Laboratory, Utah State University, Logan, Utah.	accepted	USGS National Gap Analysis Program	Yes	Interpretation, training and validation of ecological systems mapping.	Sites offer the best source for precision identification of ecological system types and locations. Additional use in long-term monitoring efforts and community changes due to development and/or climate change.
CE Class I Terrestrial Coarse Filter	California ReGap - Training Points	in review	Fine scale on the ground documentation of ecological systems. Used to develop land cover maps for CA ReGap.	Lennartz, S., et al., 2008. Final Report on Land Cover Mapping Methods for California Map Zones 3, 4, 5, 6, 12, and 13.		USGS National Gap Analysis Program	No	Interpretation, training and validation of ecological systems mapping.	Sites offer the best source for precision identification of ecological system types and locations. Additional use in long-term monitoring efforts and community changes due to development and/or climate change.
CE Class II Terrestrial Fine Filter	Black-tailed Prairie dog Colonies, 1970 - 2002	need to review	This data represents a merging of all historic and current occupied and unoccupied Black-tailed Prairie Dog colony polygons acquired through March of 2003. Data quality ranges from hand drawn digitized maps to meter accurate GPS surveyed polygons. Data		(empty)	BLM	Yes		

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CE Class II Terrestrial Fine Filter	Breeding Bird Survey (BBS)	review finished	This data consist of a series of data files that summarize population change and relative abundance for North American Birds from North American Breeding Bird Survey (BBS) data.		accepted	USGS	Yes		
CE Class II Terrestrial Fine Filter	Sage Grouse Habitat of the West	need to review	Sage Grouse habitat. Was delivered as "Bruces National Project", but only a partial delivery was obtained from BLM. The primary raster file was not delivered, only the pyramid layer.		(empty)	BLM	No		
CE Class II Terrestrial Fine Filter	Christmas Bird Count	need to review	An annual hemispheric early-winter bird census.			USGS	Yes		
CE Class II Terrestrial Fine Filter	Core Sage Grouse	need to review			(empty)	BLM	Yes		
PL Class II Specially Designated Areas of Ecological Value	Desert Tortoise critical habitat	need to review	Designation of critical habitat was based on those areas recommended for recovery of the desert tortoise in the Draft Recovery Plan for the Desert Tortoise (Mojave Population) (U.S. Fish and Wildlife Service, 1993).		accepted	USFWS	Yes		
CE Class II Terrestrial Fine Filter	Desert Tortoise predicted habitat	need to review	Predicted habitat potential index values for desert tortoise (Gopherus agassizii) in the Mojave and parts of the Sonoran Deserts of Arizona, Nevada, Utah, and Arizona.		accepted	USGS	Yes		
CE Class II Terrestrial Fine Filter	Desert Tortoise suitable habitat	in review	Suitable habitat of Desert Tortoise (gopherus agassizii) in Arizona. Digitized from 1:100,000 scale manuscripts prepared by Field Office Wildlife Specialists or digitized on-screen and edited at 1:100,000 scale or larger by GIS specialists. The criteria		accepted	BLM	Yes		
CE Class II Terrestrial Fine Filter	Mule Deer Locations	in review	Delphi (expert opinion) approach to map all mule and black-tailed deer habitat in North America and Mexico. Six categories of mule deer habitat were delineated, with 18 factors limiting or otherwise affecting the habitat. Classes include Year-around Population, Winter concentration, Winter range, Summer range, Limited range, and Other important habitat.		accepted	Utah State University Extension & RS/GIS Laboratory & National Fish	No	representation of current seasonal habitats for Mule deer CE	Relatively coarse spatial resolution, but adequate.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
						andWildlife Foundation ($)			
CE Class II Terrestrial Fine Filter	Transport Atlas Bird and Mammal distributions	need to review	This data set contains distribution information for all birds and mammals occurring in the Western Hemisphere, as well as Native US fish by watershed.			NatureServe	Yes		
CE Class II Terrestrial Fine Filter	Sage Grouse lek locations	need to review	A westwide compilation of state sagegrouse lek point datasets for year 2006		(empty)	BLM	Yes		
CE Class II Terrestrial Fine Filter	SWReGAP Vertebrate Habitat Models	in review	This dataset contains ratings of the suitability of habitat for the predicted distributions of 817 native terrestrial vertebrate species in the 5-State SWReGAP project area. Of these models, 234 are for BLM species in Mojave and/or Central Basin ecoregions.	Boykin, K. G., B. C. Thompson, R. A. Deitner, D. Schrupp, D. Bradford, L. O'Brien, C. Drost, S. Propeck-Gray, W. Rieth, K. Thomas, W. Kepner, J. Lowry, C. Cross, B. Jones, T. Hamer, C. Mettenbrink, K.J. Oakes, J. Prior-Magee, K. Schulz, J. J. Wynne, C. King, J. Puttere, S. Schrader, and Z. Schwenke. 2007. Predicted animal habitat distributions and species richness. Chapter 3 in J.S. Prior-Magee, et al., eds. outhwest Regional Gap Analysis Final Report. U.S. Geological Survey, Gap Analysis Program, Moscow, ID.		USGS GAP	Yes	Representing distributions of known and potential habitat for CE terrestrial species	High to Medium
CE Class II Terrestrial Fine Filter	Threatened and Endangered Species	in review	See "critical habitat". Need to evaluate what NS already has. Have requested additional endangered species data for Mojave.		(empty)	FWS	Yes		
CE Class II Terrestrial Fine Filter	CAGAP Vertebrate Habitat Models	need to review	This dataset contains ratings of the suitability of habitat for the predicted distributions of 455 native terrestrial vertebrate species in California. Of these models, 159 are for BLM species in the Mojave and/or Central Basin ecoregions.	Davis, F. W., D. M. Stoms, A. D. Hollander, K. A. Thomas, P. A. Stine, D. Odion, M. I. Borchert, J. H. Thorne, M. V. Gray, R. E. Walker, K. Warner, and J. Graae. 1998. The California Gap Analysis Project--Final Report. University of California, Santa Barbara, CA. [http://www.biogeog.ucsb.edu/projects/gap/gap_rep.html] Chapter 3. PREDICTED ANIMAL DISTRIBUTIONS AND SPECIES RICHNESShttp://www.biogeog.ucsb.edu/projects/gap/report/gap_rep_ch3.html		USGS			
CE Class II Terrestrial Fine Filter	Desert Tortoise Habitat Model	in review	A quantitative habitat model for the desert tortoise using an extensive set of field-collected presence data. Sixteen environmental data layers were converted into a grid covering the study	Nussear, K.E., Esque, T.C., Inman, R.D., Gass, Leila, Thomas, K.A., Wallace, C.S.A., Blainey, J.B., Miller, D.M., and Webb, R.H., 2009, Modeling habitat of the desert tortoise (Gopherus agassizii) in the Mojave and parts of		USGS	Yes	Tortoise habitat distribution	

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
			area and merged with the desert tortoise presence data that we gathered for input into the Maxent habitat-modeling algorithm. This model provides output of the statistical probability of habitat potential that can be used to map potential areas of desert tortoise habitat. This type of analysis, while robust in its predictions of habitat, does not account for anthropogenic changes that may have altered habitat with relatively high potential into areas with lower potential.	the Sonoran Deserts of California, Nevada, Utah, and Arizona: U.S. Geological Survey Open-File Report 2009-1102, 18 p.					
CE Class II Terrestrial Fine Filter	NatureServe Terrestrial Element Occurrence Data for CA, NV & UT		NatureServe, in collaboration with its member Natural Heritage Programs and Conservation Data Centres, maintains a database of rare and imperiled species and plant communities across the United States and Canada. The Element Occurrence (EO) records that form the core of the NatureServe database include information on the location, status, characteristics, numbers, condition, and distribution of elements of biological diversity using established Natural Heritage Methodology developed by NatureServe and The Nature Conservancy (TNC). An Element Occurrence (EO) is an area of land and/or water in which a species or natural community is, or was, present. An EO should have practical conservation value for the Element as evidenced by potential continued (or historical) presence and/or regular recurrence at a given location.			NatureServe	Yes	Location of CEs, input to distribution models	suitable for use
CE Class III Physical Feature (e.g., erodable soils)	Elevation Derivatives for National Applications (EDNA)	need to review	Email contact at this website with polygon file of extract area, and description of project. Derivatives: Filled DEM, Sinks, Shaded Relief, Slope, Flow direction, Flow Accumulation, Aspect, Contours, Compound Topo Index, Reach Catchment Seedpoints, Reach			USGS			
CE Class III Physical Feature (e.g., erodable	Geology	in review	Geologic map of the United States (exclusive of Alaska and Hawaii)			USGS			

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
soils)									
CE Class III Physical Feature (e.g., erodable soils)	Gravity anomaly data (Bouguer anomaly)	in review	The grid of gravity anomaly data for the conterminous United States and adjacent marine areas was constructed from National Information Mapping Agency (NIMA) gravity data files.			USGS	Yes		
CE Class III Physical Feature (e.g., erodable soils)	Land Surface Forms	in review	This dataset was derived from the NED based on various neighborhood analysis using a 1-km2 analysis window.	Sayre, R., P. Comer, H. Warner, and J. Cress. 2009. A new map of standardized terrestrial ecosystems of the conterminous United States: U.S. Geological Survey Professional Paper 1768, 17 p.		USGS	Yes		
CE Class III Physical Feature (e.g., erodable soils)	Magnetic anomaly maps and data for North America	review not needed	Digital data grids for the magnetic anomaly map of North America.			USGS	Yes		
CE Class III Physical Feature (e.g., erodable soils)	800 m PRISM Monthly Temperature	need to review				Oregon State	Yes		
CE Class III Physical Feature (e.g., erodable soils)	National Elevation Dataset - 30 m	review not needed	The National Elevation Dataset (NED) is the primary elevation data product produced and distributed by the USGS.	Citation_Information: Originator: U.S. Geological Survey (USGS) Publication_Date: 2009 Title: National Elevation Dataset (NED) Edition: 2 Geospatial_Data_Presentation_Form: raster digital data Publication_Information: Publication_Place: Sioux Falls, SD Publisher: U.S. Geological Survey Online_Linkage: http://nationalmap.gov Online_Linkage: http://seamless.usgs.gov	accepted	USGS	Yes	Spatially adequate for most modeling purposes and represents the best compete data set for the region.	The intended uses of the data are utilized by the scientific and resource management communities for global change research, hydrologic modeling, resource monitoring, mapping and visualization applications.
CE Class III Physical Feature (e.g., erodable soils)	National Elevation Dataset - 10 m	review not needed	The National Elevation Dataset (NED) is the primary elevation data product produced and distributed by the USGS.	Citation_Information: Originator: U.S. Geological Survey (USGS) Publication_Date: 2009 Title: National Elevation Dataset (NED) Edition: 2 Geospatial_Data_Presentation_Form: raster digital data Publication_Information: Publication_Place: Sioux Falls, SD Publisher: U.S. Geological Survey Online_Linkage: http://nationalmap.gov Online_Linkage: http://seamless.usgs.gov	accepted	USGS	Yes	Spatially adequate for the majority of modeling purposes. Limited, but useful, potential for systems/species with specialized gradient relationships.	The intended uses of the data are utilized by the scientific and resource management communities for global change research, hydrologic modeling, resource monitoring, mapping and visualization applications.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CE Class III Physical Feature (e.g., erodable soils)	NWS CPC Datasets	review not needed	Soil moisture, evaporation, precipitation, runoff, temperature			NWS, CPC	Yes		
CE Class III Physical Feature (e.g., erodable soils)	SSURGO	need to review	we’re waiting to hear back from our USGS partners who did the Eastern US and last I talked to them were filling in the big holes in the SSURGO data in the west.- JH			NRCS	Yes		
CE Class III Physical Feature (e.g., erodable soils)	STATSGO2: US General Soil Map					NRCS	Yes		
CE Class III Physical Feature (e.g., erodable soils)	Surficial Materials Lithology	need to review	This dataset was derived from the 28 lithology classes identified in the USGS map "Surficial Materials in the conterminous United States". These were generalized and reclassified into a set of 18 lithologies that typically control or influence the distrib	Sayre, R., P. Comer, H. Warner, and J. Cress. 2009. A new map of standardized terrestrial ecosystems of the conterminous United States: U.S. Geological Survey Professional Paper 1768, 17 p.		USGS	Yes		
CE Class III Physical Feature (e.g., erodable soils)	Base Lithology	need to review				USGS	No		
CE Class III Physical Feature (e.g., erodable soils)	Landform	in review	Topographic position of the landscape derived from the 30m NED.			USGS	No		
CE Class III Physical Feature (e.g., erodable soils)	Ombrotypes	need to review				USGS			
CE Class III Physical Feature (e.g.,	thermotypes	need to review				USGS			

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
erodable soils)									
CE Class IV Aquatic/Wetland Coarse Filter	Aquifers	review not needed	This map layer contains the shallowest principal aquifers of the conterminous United States, Hawaii, Puerto Rico, and the U.S. Virgin Islands, portrayed as polygons.			USGS	Yes	Not intended for use.	
CE Class IV Aquatic/Wetland Coarse Filter	Computed Topographic Index	in review	Combo of flow accumulation and slope for defining wetness zones			EPA			
CE Class IV Aquatic/Wetland Coarse Filter	USGS drought-detection wells gwwst0x020	in review	This map layer shows the locations of wells maintained by the U.S. Geological Survey (USGS) that are used to monitor the effects of droughts and other climate variability on ground-water levels.			USGS	Yes		
CE Class IV Aquatic/Wetland Coarse Filter	Hydrodrologic Units	in review				USGS	Yes		
CE Class IV Aquatic/Wetland Coarse Filter	Irrigation canals	need to review	Can pull from the NHD when we get the complete data.		(empty)			Will represent canals and significant ditches. Will be derived from NHD.	NHD will provide the most suitable map available.
CE Class IV Aquatic/Wetland Coarse Filter	Nation Hydrography Dataset - 1:100,000 -- aka NHDPlus	need to review		See the NHDPlus User Guide, USEPA, USGS and Horizon Systems Corporation, January 26, 2010. User Guide, description of NHDPlus, and metadata are all available athttp://www.horizon-systems.com/nhdplus/.	accepted	USGS	Yes	The NHDPlus data system provides the foundation for several assessments of aquatic CE occurrence condition, based on additional attributes for the system generated by the USGS (listed separately). NHDPlus makes it possible to use these additional data layers to assess aspects of	This is a crucial platform for several assessments.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
								catchment hydrology, climate and deposition of air pollutants.	
CE Class IV Aquatic/Wetland Coarse Filter	Nation Hydrography Dataset - 1:24,000	review not needed				USGS	Yes		
CE Class IV Aquatic/Wetland Coarse Filter	National Wetlands Inventory (NWI)	need to review	Hydrologic Units down to the 6th order		accepted	USFWS	Yes		
CE Class IV Aquatic/Wetland Coarse Filter	NWIS	review not needed	NWIS supports the acquisition, processing, storage and dissemination of information about water quantity and quality collected at over 1.5 million sites around the U.S. As a long-term database and information delivery system, NWIS provides continual access to data collected over the last 100+ years, as well as real-time data on streamflow, etc.			USGS	No		
CE Class IV Aquatic/Wetland Coarse Filter	Topographic Moisture Potential	need to review	This dataset was derived to help contribute substrate moisture regimes and was based on the derivation of ground moisture potential using a combination of computed topographic characteristics and mapped National Wetland Inventory boundaries.	Sayre, R., P. Comer, H. Warner, and J. Cress. 2009. A new map of standardized terrestrial ecosystems of the conterminous United States: U.S. Geological Survey Professional Paper 1768, 17 p.		USGS	Yes		
CE Class IV Aquatic/Wetland Coarse Filter	U.S. Army Corps of Engineers Navigable Waterway Network (Line)	review not needed	The National Waterway Network is a comprehensive network database of the nation's navigable waterways.			Bureau of Transportation Statistics	Yes		
CE Class IV Aquatic/Wetland Coarse Filter	U.S. Army Corps of Engineers Navigable Waterway Network (Node)	review not needed	The National Waterway Network is a comprehensive network database of the nation's navigable waterways.			Bureau of Transportation Statistics	Yes		

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CE Class IV Aquatic/Wetland Coarse Filter	Watershed Boundary Database	need to review			(empty)	NRCS			
CE Class IV Aquatic/Wetland Coarse Filter	2000 springs Biological/Environmental database: Desert Research Institute	in review	Dr. Don Sada, Desert Research Institute, NV is compiling a database on biotic and environmental conditions for almost 5000 springs in our ecoregion. He is willing to work with us pending future discussions.		(empty)	Desert Research Institute University Nevada Reno	Yes	This multipurpose data set will provide fine filter information on native and non-native aquatic species	This data has been not been evaluated.
CE Class IV Aquatic/Wetland Coarse Filter	Nevada DEP Stream Bioassessment Data	need to review	Nevada began its Bioassessment Program in the year 2000 and has continued to collect biological, chemical and physical habitat information on an annual basis throughout Nevada.			Nevada Division Environmental Protection Bureau of Water Quality Planning, Bioassessment Program	Unknown	These data will meet two needs: (1) The assessment of current biotic condition in stream/river ecosystem CEs; and (2) the assessment of aquatic nuisance species distributions among CEs and their associated HUCs.	If the data meet standards set by EPA Western Streams Assessment for sampling design, field methods, and analysis, they can be included in the baseline assessment.
CE Class IV Aquatic/Wetland Coarse Filter	USEPA National Lakes Assessment	need to review	EPA and its state and tribal partners have conducted a survey of the nation's lakes, ponds and reservoirs. This National Lakes Assessment is designed to provide statistically valid regional and national estimates of the condition of lakes. It uses a probability-based sampling design to represent the condition of all lakes in similar regions sharing similar ecological characteristics. Consistent sampling and analytical procedures ensure that the results can be compared across the country.			USEPA	Unknown	This multipurpose data set will provide fine filter information on native and non-native aquatic species	

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CE Class IV Aquatic/Wetland Coarse Filter	Lakes, Playas, and Other Water Bodies of Nevada	need to review	NV Heritage ecologist attributed layer of lakes, playas, rivers Categories include mud playa, salt playa,. Also designated Major (large) and Minor (small)			Nevada Natural Heritage Program			
CE Class IV Aquatic/Wetland Coarse Filter	NV Spring Terrestrial Vegetation Dataset	need to review	171 vegetation plot taken at Springs throughout NV by the heritage program. Included Plant Association Name and EO Rank information.						
CE Class IV Aquatic/Wetland Coarse Filter	National Atmospheric Deposition Program (NADP) Atmospheric Deposition	in review	The National Atmospheric Deposition Program (NADP) monitors precipitation chemistry. The program is a cooperative effort between many different group, including federal, state, tribal and local governmental agencies, educational institutions, private companies, and non-governmental agencies. See URLhttp://nadp.sws.uiuc.edu/Default.aspx for details			USGS	Yes	These data, along with regional estimation model output from the NADP website, support the assessment of the threat(s) posed by atmospheric deposition as a CA.	These are the best data to use for the assessment of atmospheric deposition rates and their spatial variation.
CE Class IV Aquatic/Wetland Coarse Filter	California Groundwater Basins from Calif. DWR	review finished	Map of California Groundwater Basins and identification numbers linked to CDWR Bulletin 118 (2003) for technical info on each basin. Seehttp://www.water.ca.gov/groundwater/bulletin118/gwbasin_maps_descriptions.cfm			California Department of Water Resources	Yes	These data will be used to delineate groundwater basins, in conjunction with the extraction of information from CDWR Bulletin 118 (2003) to identify aquifers that significantly affect the hydrology of spring/seep and stream/river CEs. The CDWR data provide a state-specific backup to the data in the USGS Southwest Principal Aquifers study.	These data are a highly suitable backup to using data from the USGS Southwest Principal Aquifers study. We'll use whichever is more precise.
CE Class IV Aquatic/Wetland Coarse Filter	Arizona Groundwater Basins	review finished	Arizona groundwater basins,http://www.azwater.gov/azdwr/GIS/: "The data provide base information for use in GIS systems to aid in assessment for a variety of planning and analysis purposes and to provide a geographic view with corresponding data. 'Groundwater basin' means an area which, as nearly as known facts permit as determined by the director pursuant to this chapter, may be designated so as to		rejected	Arizona Department of Water Resources	Yes	These data are to be used as a backup to data from the USGS Southwest Principal Aquifers study, to delineate groundwater basins that have significant bearing on aquatic CEs, specifically, springs and seeps, and streams and rivers.	These data are highly suitable at the state level, as a substitute for aquifers delineated by the USGS Southwest Principal Aquifers study. We'll use whichever is more precise.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
			enclose a relatively hydrologically distinct body or related bodies of groundwater, which shall be described horizontally by surface description."						
CE Class IV Aquatic/Wetland Coarse Filter	Arizona Groundwater Sub-Basins	review finished	Arizona groundwater subbasins,http://www.azwater.gov/azdwr/GIS/: "The data provide base information for use in GIS systems to aid in assessment for a variety of planning and analysis purposes and to provide a geographic view with corresponding data. 'Subbasin' means an area which, as nearly as known facts permit as determined by the director pursuant to this chapter, may be designated so as to enclose a relatively hydrologically distinct body of groundwater within a groundwater basin, which shall be described horizontally by surface description."			Arizona Department of Water Resources	Yes	This provides a more detailed view of groundwater distribution, by sub-basin, in Arizona. It is to be used as an Arizona-specific "backup" to the data from the USGS Southwest Principal Aquifers study. The sub-basin polygons are nested within the groundwater Basin polygons, represented in a separate dataset.	This is a state-specific dataset, highly suitable for use as a backup to using the USGS Southwest Principal Aquifers data, whichever is the more precise.
CE Class IV Aquatic/Wetland Coarse Filter	Arizona Groundwater Site Inventory	review finished	Arizona Groundwater Site Inventory (GWSI) database, http://www.azwater.gov/azdwr/GIS/ is ADWR's main repository for state-wide groundwater data. The GWSI consists of field-verified data regarding wells and springs collected by personnel from Hydrology Division's Basic Data Section, the U.S. Geological Survey, and other co-operating agencies.			Arizona Department of Water Resources	Yes	Unless we have comparable data from the other states in either CBR or MBR, this becomes a localized dataset. It's purpose is to help assess the intensity of groundwater use, as a backup to using the data in the Southwest Principal Aquifers study.	This provides backup data for purposes of assessing the threats posed by groundwater extraction to stream and spring CEs.
CE Class IV Aquatic/Wetland Coarse Filter	Stream baseflow index grid for the conterminous US-USGS	review finished	This 1-kilometer raster (grid) dataset for the conterminous United States was created by interpolating base-flow index (BFI) values estimated at U.S. Geological Survey (USGS) streamgages. Base flow is the component of streamflow that can be attributed to ground-water discharge into streams. For all documentation and citations, seehttp://water.usgs.gov/GIS/metadata/usgswrd/XML/bfi48grd.xml andhttp://ks.water.usgs.gov/pubs/abstracts/of.03-263.htm (the latter site also provides contact information for the dataset author).	Wolock, D.M., 2003b, Estimated mean annual natural ground-water recharge estimates in the conterminous United States: U.S. Geological Survey Open-File Report 03-311, digital dataset, available on the World Wide Web, accessed August 20, 2003, at URLhttp://water.usgs.gov/lookup/getspatial?rech48grd		USGS	Yes	Allows assessment of stream baseflow by aggregating the gridded data by HUC. This in turn is a crucial component of stream hydrology for arid lands streams, which we can therefore assess for current conditions	Very high; the USGS "BFI" method is well established and well documented.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CE Class IV Aquatic/Wetland Coarse Filter	Nitrate contamination, probability for recently recharged ground waters in the Conterminous US	in review	This data set is a national map of predicted probability of nitrate contamination of shallow ground waters based on a logistic regression (LR) model. The LR model was used to predict the probability of nitrate contamination exceeding 4 mg/L in predominantly shallow, recently recharged ground waters of the US. For all documentation and citations, seehttp://water.usgs.gov/GIS/metadata/usgswrd/XML/gwrisk.xml	Nolan, B.T., Hitt, K.J., and Ruddy, B.C., 2002, Probability of nitrate contamination of recently recharged ground waters in the conterminous United States. Environmental Science and Technology Volume 36, Number 10, Pages 2138-2145.		USGS		Provides a means to assess potential for altered nutrient regime in streams, springs and wetlands, in absence of field data on nutrient levels.	Strongly suitable, but may not be very informative for many areas of CBR and MBR where nearby sources of nitrate are sparse.
CE Class IV Aquatic/Wetland Coarse Filter	Hydrographic data for Great Basin groundwater systems, 1:1,000,000	review not needed	This three-part data set consists of 1:1,000,000-scale (a) areas where shallow ground water is consumed by evapotranspiration (ET); (b) hydrographic area and major flow system boundaries and polygons; and (c) large springs for the Great Basin. The source is Harrill, J.R., Gates, J.S., and Thomas, J.M., 1988, Major ground-water flow systems in the Great Basin region of Nevada, Utah, and adjacent states: U.S. Geological Survey Hydrologic Investigations Atlas HA-694-C, scale 1:1,000,000	Harrill, J.R., Gates, J.S., and Thomas, J.M., 1988, Major ground-water flow systems in the Great Basin region of Nevada, Utah, and adjacent states: U.S. Geological Survey Hydrologic Investigations Atlas HA-694-C, scale 1:1,000,000		USGS	Yes	To identify which aquifers/watersheds contribute the water that supports the crucial baseflow in streams and water levels/discharge rates in springs.	This is an older dataset that will be compared to the newer SWPA dataset from USGS, to identify which is best for providing basic information on surface-groundwater interactions in the MBR.
CE Class IV Aquatic/Wetland Coarse Filter	Hydrologic Attributes for NHDPlus Catchments (Version 1.1) for the Conterminous United States	review finished	These are datasets developed by the USGS as attributes for NHDPlus Catchments. They provide data on catchment atmospheric deposition (2 datasets) and catchment hydrology (6 datasets).	BFI: Wolock, D.M., 2003, Base-flow index grid for the conterminous United States: U.S. Geological Survey Open-File Report 03–263, digital data set, available at http://water.usgs.gov/lookup/getspatial?bfi48grd.		USGS	Yes	The two atmospheric deposition datasets provide a single-year snapshot of nitrate deposition, as a backup to using estimates directly from the NADP database, to assess this CA. The data will be aggregated by HUC for CA analysis. The six hydrologic datasets provide information on related to runoff and recharge behavior by catchment. They also will be aggregated by HUC, but for for CE condition analysis. Additionally, they provide a "Plan B" for assessing the impacts of	The two atmospheric deposition datasets provide a highly suitable backup to working directly with NADP data and regionalized deposition estimates for this CA analysis. The baseflow, runoff and recharge datasets provide a key means for characterizing the hydrology of stream ecosystem CEs. And the six hydrologic datasets together provide a highly suitable backup to working directly with the Flint et al. USGS forecast data on the impacts of climate change, especially if the GCM, emissions scenario, or timestep choices built into the Flint et al. data are not compatible with those used in the rest of the CBR and MBR REAs.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
								climate change on runoff and recharge, as a backup to our using the Flint et al. USGS modeled (forecast) data.	
CE Class IV Aquatic/Wetland Coarse Filter	USGS Southwest Principal Aquifers (SWPA) study data	in review	These are five datasets from the USGS Southwest Principal Aquifers (SWPA) study, published in 2008 as Geospatial Data to Support Analysis of Water-Quality Conditions in Basin-Fill Aquifers in the Southwestern United States, U.S. Geological Survey Scientific Investigations Report (SIR) 2008-5239.	McKinney, T.S., and Anning, D.W., 2009, Geospatial data to support analysis of water-quality conditions in basin-fill aquifers in the southwestern United States: U.S. Geological Survey Scientific Investigations Report 2008-5239, 16 p. Available at http://pubs.er.usgs.gov/sir/2008/5239.		USGS	Yes	These data identify and delineate the aquifers on which spring/seep and stream/river CEs depend for maintaining water levels or base flows. Additionally, the data provide crucial information on agricultural and municipal water use from these aquifers -- information crucial to assessing the potential impacts of future water resource development associated with land development or other forms of development (as a CA).	These will probably be our primary datasets for assessing which aquifers support which aquatic ecosystem CEs; and our primary means for assessing the potential impacts of water resource or land development (as CAs) on these CEs.
CE Class IV Aquatic/Wetland Coarse Filter	USGS-Nevada State joint study of Nevada alluvial aquifers	in review	Three data sets were created as part of a U.S. Geological Survey study, done in cooperation with the Nevada Division of Environmental Protection, to evaluate the susceptibility and vulnerability of ground water to anthropogenic contamination.	Lopes, T.J., Buto, S.G., Smith, J.L., and Welborn, T.L., 2006, Water-table levels and gradients, Nevada, 1947-2004: U.S. Geological Survey Scientific Investigations Report 2006-5100		USGS		This is a backup dataset for the delineation of aquifers critical to supporting spring/seep and stream/river CEs. It also provides information on changes in water storage in these aquifers, which supports the assessment of water use as a potential stressor/CA.	This is a backup to using the data generated by the USGS Southwest Principal Aquifers study. It is a state database; we'll use whichever is more precise.
CE Class IV Aquatic/Wetland Coarse Filter	Utah State University-Western Center for Monitoring & Assessment of Freshwater Ecosystems database system	in review	This is the site of a query tool to download data generated by: the USEPA EMAP Western Streams Assessment project; two USEPA STAR grant projects to Utah State University in support of the Western Streams Assessment; and the BLM. The data are managed by the Western Monitoring Center at Utah State University (see link in Dataset Filename entry).			USEPA and BLM via Utah State University		These data provide primary information on the biological condition of stream/river ecosystem CEs.	Because the EMAP and STAR data were developed through a statistically robust geographic sampling design, they provide the statistically most reliable basis for assessing stream/river CE condition without concern for spatial sampling biases at the regional scale.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CE Class IV Aquatic/Wetland Coarse Filter	Stream baseflow index-Western US-Hill & Olson	in review	Calculation of the percentage of flow attributed to groundwater. Index was calculated for each of 9,941 USGS gaging stations in the western USA and values for unmeasured locations were interpolated using inverse-distance-squared weighting of the 12 closest gaging stations within 100 kilometers. Each interpolated value represents a 4 x 4 kilometer cell.			Utah State University, via authors (Hill & Olson)		This would be used as a backup database to assess the contribution of groundwater discharge to the hydrologic regime of stream/river ecosystem CEs; we would use the Hill & Olson findings if we encounter problems with the USGS (Wolcock) model of baseflow.	Highly suitable for assessing the baseflow component of stream/river hydrologic regimes.
CE Class IV Aquatic/Wetland Coarse Filter	Utah Department of Environmental Quality, comprehensive assessment of stream ecosystems (UCASE)	in review	A database generated by the state of Utah's comprehensive stream biomonitoring program, containing data on stream biotic and habitat condition. The 2008-9 strategic plan and the data we potentially need can be accessed through the following links: http://www.waterquality.utah.gov/Monitoring/index.htm The same location lists a contact for questions about the data: Jim Harris at 801-536-4360 or e-mailjamesharris@utah.gov			Utah Department of Environmental Quality		These data provide information on biotic and habitat conditions in stream/river ecosystem CEs sampled at the state scale, to supplement and complement the Western Streams Assessment information (see listing under Utah State University). The database may also include information on aquatic nuisance species.	High, as complement to the regional (EMAP) database.
CE Class IV Aquatic/Wetland Coarse Filter	USEPA National Database of State Water Quality Status Listings	in review	This is the Reach Address Database (RAD) Download website. It is the source for the most recent EPA-approved state listings of: 303(d) Listed Impaired Waters; 305(b) Assessed Waters; Clean Watersheds Needs Survey; Fish Consumption Advisories; Nonpoint Source Projects; STORET Water Monitoring Locations; Facilities that Discharge to Water; Impaired Waters with TMDLs; and State Water Quality Standards. We would need to download each, for UT, NV, CA, and AZ; it may be possible select by HUC rather than by State.			USEPA, compiled from EPA-approved state water quality assessments	Yes	These data will allow us to assess current condition of all freshwater ecosystem and community CEs in terms of whether waters meet state water quality standards and what actions the states have identified as necessary to address both point and nonpoint source pollution and other stressors.	Short of our doing our own assessment of masses of water quality monitoring and watershed data, this is the best way for us to conduct a rapid assessment of whether individual water-body CEs are recognized by each state as "impaired" and, if so, the likely causes of that impairment.
CE Class IV Aquatic/Wetland Coarse Filter	Groundwater_Climate_Response_Network	in review	Supplied data is incomplete. Shape file provided has 5 wells for NV, while on the web site they list data from 854 wells.				Yes		

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CE Class IV Aquatic/Wetland Coarse Filter	BLM-Utah State University National Aquatic Monitoring Center Data	in review	The BLM National Aquatic Monitoring Center at Utah State University, aka the "Buglab" (http://www.usu.edu/buglab/) has built a large database of stream bioassessment data, mostly on benthic macroinvertebrates from stream sites on public lands throughout the western US. Some habitat data are also included. The data were not collected under a single spatial sampling design, but aside from their spatial unevenness they are among the best available and complement those maintained by the USU Western Monitoring Center (see separate entry).			BLM		The Buglab data will supplement the data from the Western Monitoring Center, for assessing the biotic condition of aquatic (stream/river) ecosystem CEs, and will help map the distribution of aquatic nuisance species (a CA). Dr. Miller has also developed regional benthic macroinvertebrate IBI metrics, and his regional classification may help identify distinct stream ecosystem types within the two ecoregions.	Very high. Potentially spatially uneven, so best if used in conjunction with the WMC data (see separate entry).
CE Class IV Aquatic/Wetland Coarse Filter	USEPA National Wadeable Streams Assessment	in review	The Wadeable Streams Assessment (WSA) is a first-ever statistically-valid survey of the biological condition of small streams throughout the U.S. The U.S. Environmental Protection Agency (EPA) worked with the states to conduct the assessment in 2004-2005.			USEPA		These data will supplement those obtained from the Western Monitoring Center, BLM "Buglab," and state bioassessment programs, for the assessment of (a) stream ecosytem CE condition and (b) aquatic nuisance species distributions (relates to a CA).	Limited sample size but wide breadth of data and sophisticated field and laboratory methods make this a dataset of limited use but highly suitable for that use.
CE Class IV Aquatic/Wetland Coarse Filter	Nevada 2006 303(d)/305(b) Impaired Waters List	in review	This presents the entire state of Nevada database on its "Impaired Waters" as required under the federal Clean Water Act. The data provide information on the status (degree of impairment) of all waters of the state, tagged by NHD designation. This is a backup dataset to the USEPA national integration of all states' Impaired Waters data for the last full reporting cycle (2006). We will use whichever is the more current.			Nevada DEP		This is a backup to using the USEPA national database on 303d/305b impaired waters, TMDLs, etc. If the USEPA database is current (and it should be) then we won't also need to use the Nevada state data layers. Either way, the data provide a means for assessing overall ecological integrity of aquatic ecosystem CEs based on state assessment of whether they meet "aquatic life use" standards. The "causes	Highly suitable, either as obtained from the state or from the USEPA.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
								of impairment" listed for some waters may also include invasive species (aquatic nuisance species), so the data will help with that CA assessment as well.	
CE Class IV Aquatic/Wetland Coarse Filter	California Surface Water Ambient Monitoring Program (SWAMP) Bioassessment Data	need to review	Stream/river bioassessment data for the state of California, collected according to rigorous state data collection and analysis standards.	E.g., Ode, P.R. and A.C. Rehn. 2005 Probabilistic assessment of the biotic condition of perennial streams and rivers in California. Report to the State Water Resources Control Board. California Department of Fish and Game Aquatic Bioassessment Laboratory, Rancho Cordova, California. Ode, P.R. 2007 Ecological condition assessment of California's perennial wadeable streams. Report to the State Water Resources Control Board's Non-Point Source Program. California Department of Fish and Game Aquatic Bioassessment Laboratory, Rancho Cordova, California.		California EPA, State Water Resources Control Board		As with the other state bioassessment datasets, these will be used to supplement the data from the regional stream bioassessment monitoring programs, the data for which will come from the two datasites at Utah State University, either from the BLM "Buglab" or the Western Monitoring Center. The data provide information on the biotic condition of stream ecosystem CEs; and on the distribution of aquatic nuisance species for that CA assessment.	Very high, although limited to wadeable, perennial streams -- which in both the CBR and MBR have very limited spatial distributions.
CE Class IV Aquatic/Wetland Coarse Filter	Arizona DEQ Bioassessment Program Data	need to review	Freshwater bioassessment data collected by ADEQ in support of the state water quality monitoring program. Data will include information on the biotic condition of probably both streams and lakes aquatic ecosystem CEs; and on aquatic nuisance species for CA assessment.			Arizona DEQ		As with the other state bioassessment databaes, this database will provide information on the biotic condition of aquatic ecosystem CEs; and will contain information on aquatic nuisance species for CA assessment.	Highly suitable as supplement to the regional data, but limited to perennial waters.
CE Class IV Aquatic/Wetland Coarse Filter	U.S. Army Corps of Engineers National Inventory of Dams (NID)	review not needed	The NID contains 60 fields of data (identification, location, characteristics) for all dams that meet at least one of four criteria: 1) High hazard classification - loss of one human life is likely if the dam fails; 2) Significant hazard classification - possible loss of human life and likely significant property or environmental destruction; 3) Equal or exceed 25 feet in height and exceed 15 acre-feet in storage; or 4) Equal or exceed 50 acre-feet storage and exceed 6 feet in height. Data gaps are	Documentation on the NID is available at the website noted above, e.g., origins, update procedures, data fields, etc.		US Army Corps of Engineers		To help characterize aquatic coarse-filter CE condition w/r/t connectivity; and to help identify artificial water bodies to address surface water MQs	Very high

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
			possible due to lags or inaccuracies in what states/tribes/territories report to NID.						
CE Class IV Aquatic/Wetland Coarse Filter	USGS Arid Western US runoff and recharge potential	need to review	These are data developed by Flint and Fliint (2007 -- see Citation) to estimate watershed runoff and recharge potential using a 270m grid across most of the arid and semiarid western US as part of a study to investigate the interactions of climate and other controlling factors for runoff and recharge.	Flint, Lorraine E. and Alan L. Flint, 2007, Regional analysis of ground-water recharge. Chapter B, pages 29-60, in Stonestrom, D.A., Constantz, J., Ferré, T.P.A., and Leake, S.A., eds., Ground-water recharge in the arid and semi- arid southwestern United States: U.S. Geological Survey Professional Paper 1703.		USGS		The data will provide crucial information on (a) the surface-runoff driven component of stream hydrologic regimes for coarse-filter aquatic CEs; and (b) the likely recharge zones (and rates of recharge) for basin fill aquifers, the eventual discharges from which support baseflow in these same CEs. The data are also necessary because the authors have also modeled the same hydrologic variables on the same grid based on downscaled climate projections. So we will be able to compare their "current conditions" model (described here) with the forecast conditions model (described in a separate entry) to assess potential impacts of climate change on stream hydrology and groundwater recharge.	Superb.
CA Class IV Climate Change	USGS Arid Western US future runoff and recharge potential under climate change	need to review	This dataset rests on the work by Flint and Flint (2007) described in the entry for "USGS Arid Western US runoff and recharge potential," but provides estimates of future hydrologic conditions based on climate change modeling. In May 2010, in an email message to Marni Koopman, the authors described the dataset as follows: "We are currently in the process of publishing finely downscaled climate change scenarios for the desert southwest and California.	The publication for the new data is not yet available; see Citation for the separate entry, "USGS Arid Western US runoff and recharge potential," for the original model description (Flint and Flint 2007)		USGS		These data are the primary tool we will use to assess the potential impacts of climate change on stream hydrology for coarse-filter aquatic CEs. As described above and in the entry for "USGS Arid Western US runoff and recharge potential," we will compare the model	Superb

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
			These are at 270-m spatial resolution for GFDL and PCM A2 and B1, with A1Fi to follow this summer.					output for current versus projected runoff and recharge, aggregated to the scale of the watershed for each coarse-filter aquatic CE occurrence. This will allow a comparison of the ways in which mean annual total discharge, mean annual baseflow, and mean monthly discharge potentially will change under different climate change scenarios. We need to find out what time-steps the authors used, to know how we may be able to line up this assessment with that for terrestrial change.	
CE Class V Aquatic/Wetland Fine Filter	NatureServe Aquatic Element Occurrence Data for CA, NV & UT		NatureServe, in collaboration with its member Natural Heritage Programs and Conservation Data Centres, maintains a database of rare and imperiled species and plant communities across the United States and Canada. The Element Occurrence (EO) records that form the core of the NatureServe database include information on the location, status, characteristics, numbers, condition, and distribution of elements of biological diversity using established Natural Heritage Methodology developed by NatureServe and The Nature Conservancy (TNC). An Element Occurrence (EO) is an area of land and/or water in which a species or natural community is, or was, present. An EO should have practical conservation value for the Element as evidenced by potential continued (or historical) presence and/or regular recurrence at a given location.			NatureServe	Yes		

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CE Class III Physical Feature (e.g., erodable soils)	GEOSS USA Moisture Class	in review	Assignment of flow accumulation models to specific moisture categories. Class 1: Wetlands - CTI>=18.5 Class 2: Mesic Uplands - 12<=CTI<18.5 Class 3: Dry Uplands - CTI<12 & not satisfy the aspect and slopes thresholds that identify very dry uplands (below) Class 4: Very Dry Uplands - CTI<12 & 91<=aspect<= 314 & slopes<24degrees(44.5%)			USGS	Yes		
CE Class IV Aquatic/Wetland Coarse Filter	Western Riparian Threats Assessment	need to review	Coarse-scale quantitative assessment of threats to riparian ecosystems using avialable spatial data applicable across wetern conterminous U.S.	Theobald, D.M., D.M., Merritt, and J.B. Norman, III. 2010. Assessment of threats to riparian ecosystems in the western U.S.		Forest Service		Calibration of aquatic CE condition assessment; considerations for reporting options.	TBD
CE Class V Aquatic/Wetland Fine Filter	Critical Habitat	need to review	These datasets identify the areas (in general) where final critical habitat for a variety of threatened and endangered plant and animal species occurs		accepted	USFWS	Yes		
CE Class V Aquatic/Wetland Fine Filter	EcoAnalysts Inc macroinvertebrate databases	need to review	EcoAnalysts Inc., Moscow ID has conducted taxonomic identification of aquatic macroinvertebrates, including natives and invasives, for hundreds of projects and hundreds of clients in the Western USA.			multiple agencies, compiled by EcoAnalysts, Moscow, ID	Unknown	This multipurpose data set will provide fine filter information on distribution of macro invertibrates	This data has been evaluated and is suitable for use.
CA Class I Wildfire	MTBS Burn Severity	need to review	The Monitoring Trends in Burn Severity (MTBS) project assesses the frequency, extent, and magnitude (size and severity) of all large wildland fires (includes wildfire, wildland fire use, and prescribed fire) in the conterminous United States (CONUS).			MTBS	No		
CA Class I Wildfire	MTBS Fire Occurrence	need to review	The Monitoring Trends in Burn Severity (MTBS) project assesses the frequency, extent, and magnitude (size and severity) of all large wildland fires (includes wildfire, wildland fire use, and prescribed fire) in the conterminous United States (CONUS), Alas			MTBS	Yes		

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CA Class I Wildfire	MTBS Fire Perimeters	need to review	The Monitoring Trends in Burn Severity (MTBS) project assesses the frequency, extent, and magnitude (size and severity) of all large wildland fires (includes wildfire, wildland fire use, and prescribed fire) in the conterminous United States (CONUS), Alas			MTBS	Yes		
CA Class I Wildfire	GeoMAC - Geospatial Multi-Agency Coordination		This is a data set to represent the existing condition of a fire incident at the time data edit.		accepted	USGS	Yes		
CA Class I Wildfire	LANDFIRE Fire Behavior Models		13 Anderson (1982) Fire Behavior Fuel models; 40 Scott and Burgan (2005) Fire Behavior Models http://www.landfire.gov/products_national.php		accepted	LANDFIRE	Yes		
CA Class I Wildfire	NLDN (National Lightning Detection Network)	need to review	The National Lightning Detection Network, NLDN, consists of over 100 remote, ground-based sensing stations located across the United States that instantaneously detect the electromagnetic signals given off when lightning strikes the earth's surface.			NLDN, BLM	No		
CA Class I Wildfire	LANDFIRE FRCC Departure Index	in review	The Fire Regime Condition Class (FRCC) Departure Index data product uses a range from 0 to 100 to depict the amount that current vegetation has departed from simulated historical vegetation reference conditions.			LANDFIRE		These data will be used to inform the fire frequencies and extent parameters in the quantitative terrestrial (VDDT) models.	These data are suitable, in association with other data, for their intended purpose. The data are, by and large, not suitable in isolation.
CA Class I Wildfire	LANDFIRE Mean Fire Return Interval	in review	The Mean Fire Return Interval layer quantifies the average period between fires under the presumed historical fire regime. This frequency is derived from vegetation and disturbance dynamics simulations using LANDSUM (Keane and others 2002, Hann and others 2004).			LANDFIRE			
CA Class I Wildfire	LANDFIRE Percent of Low-severity Fire	in review	The Percent of Low-severity Fire layer quantifies the amount of low-severity fires relative to mixed- and replacement-severity fires under the presumed historical fire regime.			LANDFIRE		These data will be used to inform the fire frequencies and extent parameters in the quantitative terrestrial (VDDT) models.	These data are suitable, in association with other data, for their intended purpose. The data are, by and large, not suitable in isolation.
CA Class I Wildfire	LANDFIRE Percent of Mixed-severity Fire	in review	The Percent of Mixed-severity Fire layer quantifies the amount of mixed-severity fires relative to low- and replacement-severity fires under the presumed historical fire regime.			LANDFIRE		These data will be used to inform the fire frequencies and extent parameters in the quantitative terrestrial	These data are suitable, in association with other data, for their intended purpose. The data are, by and large, not suitable in isolation.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
								(VDDT) models.	
CA Class I Wildfire	LANDFIRE Percent of Replacement-severity Fire	review finished	The Percent of Replacement-severity Fire layer quantifies the amount of replacement-severity fires relative to low- and mixed-severity fires under the presumed historical fire regime.		accepted	LANDFIRE		These data will be used to inform the fire frequencies and extent parameters in the quantitative terrestrial (VDDT) models.	These data are suitable, in association with other data, for their intended purpose. The data are, by and large, not suitable in isolation.
CA Class I Wildfire	LANDFIRE Environmental Site Potential (ESP)	review not needed	The LANDFIRE Environmental Site Potential (ESP) layer represents the vegetation that could be supported at a given site based on the biophysical environment, regardless of natural disturbance regime.			LANDFIRE		Give suitability of BpS maps for related purpose, this map will not be needed.	
CA Class I Wildfire	LANDFIRE Existing Vegetation Height (EVH)	need to review	Vegetation height represents the average height of the dominant vegetation for a 30-m grid cell.			LANDFIRE			
CA Class I Wildfire	LANDFIRE Existing Vegetation Cover (EVC)	review finished	Vegetation cover represents the average percent cover of existing vegetation for a 30-m grid cell.		rejected	LANDFIRE		These data provide seamless coverage of vegetation coverage by class.	NatureServe has more recent and more relevant data on vegetation coverage. Those will be used for spatial modelling / assessments.
CA Class I Wildfire	LANDFIRE Fire Regime Condition Class (FRCC)	review not needed	Fire regime condition class (FRCC) is a discrete metric that quantifies the amount that current vegetation has departed from the simulated historical vegetation reference conditions			LANDFIRE			
CA Class I Wildfire	USGS Land Treatment Digital Library	in review	The LTDL is a centralized digital library hosted by the USGS for federal managers and scientists. The LTDL stores and displays data from previously established land treatments or what often are called legacy data.			USGS			
CA Class I Wildfire	Fire Effects Information System	review not needed	The Fire Effects Information System is a compendium of research reports and other publications relating the effects of fire on native plant and animal species, invasive species, ecological communities, and soils.			USFS		These data will be used to inform the fire frequencies and extent parameters in the quantitative terrestrial (VDDT) models.	These data are suitable, in association with other data, for their intended purpose.
CA Class I Wildfire	National Interagency Fuels, Fire, and Vegetation Technology Transfer (NIFTT)	review not needed	The NIFTT provides a suite of tools and documents on fire effects, fire and fuels management, and fire ecology.			USGS		These data will be used to inform the fire frequencies and extent parameters in the quantitative terrestrial	These data are suitable, in association with other data, for their intended purpose.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
								(VDDT) models.	
CA Class I Wildfire	National LANDFIRE Vegetation Dynamics Models	review finished	These are VDDT models for all terrestrial systems as BpS units with some natural fire regime.		accepted	LANDFIRE		These models, and their supporting data, are intended to provide foundational information for the quantitative terrestrial models produced for the CBR and MBR ecoregions.	These models, and their supporting data, are suitable for foundational information. The models were created to study historic vegetation patterns and dynamics. As a result, they do not include unique anthropogenic ecological states, and thus are not suitable for inclusion into the model library without review and revision.
CA Class I Wildfire	TNC Updated Landfire Vegetation Dynamics models	review finished	these are models created for the Great Basin by TNC science staff.		accepted	TNC			
CA Class II Developme nt	2009 Cropland Data Layer	review not needed	See Common Land Unit. This data is produced by the Farm Service Agency they are call CLU files (Common Land Units). Now done for the entire US. Check the USDA Geospatial Gateway website for download. Another option is to contact the FSA coordinator for the state you are interested in and request the statewide shapefile. This data is UNAVAILABLE per BLM and Farm Services.		(empty)	Farm Service Agency & NASS	No	Not intended for use.	
CA Class II Developme nt	Agriculture Census of the United States	review not needed	This map layer portrays a selected set of information that was collected for the 2002 Census of Agriculture by the National Agricultural Statistics Service, U.S. Department of Agriculture.	USDA. 2007. Agriculture Census of the United States. US Department of Agriculture, National Agricultural Statistics Service. http://www.agcensus.usda.gov/	rejected	USDA	Yes	Not intended for use.	
CA Class II Developme nt	Alternative Fuels Stations	review not needed	The Alternative Fuels database is a geographic point database of fueling facilities that offer fuels other than gasoline in the United States.			Bureau of Transpo rtation Statistic s	Yes	Not intended for use.	
CA Class II Developme nt	AM (zip) (07-31-2009)	in review	Extract of AM Radio StationTransmitter sites.		(empty)	FCC Media Bureau	No	May be used in conjunction with BLM Linear Features maps, energy transmission and others to represent disturbance features on the landscape.	This data set requires metadata to be thematically and technically suitable for the intended use.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CA Class II Development	Amtrak Stations	review not needed	This database is a geographic data set containing Amtrak intercity railroad passenger terminals in the United States and Canada.			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	Antenna Structure Registration (ASR) (zip) (07-26-2009)	in review	Extract of FCC Antenna Structure Registration database.			FCC Media Bureau	No	May be used in conjunction with BLM Linear Features maps, energy transmission and others to represent disturbance features on the landscape.	This data set requires metadata to be thematically and technically suitable for the intended use.
CA Class II Development	Automatic Traffic Recorder Stations	review not needed	The data included in the GIS Traffic Stations Version database have been assimilated from station description files provided by FHWA for Weigh-in-Motion (WIM), and Automatic Traffic Counters (ATR).			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	Biomass Potential (2005)	review not needed	Biomass resource potential for the lower 48 states of the United States of America.	NREL. 2005. A Geographic Perspective on the Current Biomass Resource Availability in the United States. http://www.nrel.gov/docs/fy06osti/39181.pdf	rejected	NREL	No	Not suitable for use.	
CA Class II Development	Biomass Potential (2008)	review finished	Biomass Resources in the United States	NREL. 2008. Biomass Resources in the United States. http://www.nrel.gov/docs/fy06osti/39181.pdf	rejected	NREL	Yes	Not intended for use.	Not suitable.
CA Class II Development	BLM Linear Disturbance Maps	need to review	Linear disturbance (Roads, Trails)		accepted	BLM	No		
CA Class II Development	Cellular (zip) (07-26-2009)	in review	Extract of Cellular Radiotelephone Service sites.			FCC Media Bureau	No	May be used in conjunction with BLM Linear Features maps, energy transmission and others to represent disturbance features on the landscape.	This data set requires metadata to be thematically and technically suitable for the intended use.
CA Class II Development	Cities and Towns of the United States	review not needed	This map layer includes cities in the United States, Puerto Rico and the U.S. Virgin Islands.			USGS	Yes	Intended as reference only	Suitable for reference only.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CA Class II Development	Housing Density Change co_pbg00 (Colorado Dataset)	review not needed	The overarching goal of this analysis was to create a long-term dataset on housing density change that is accurate, spatially detailed, and consistent across the United States.			USDA, et al	Yes	Not intended for use.	
CA Class II Development	Census Block Attributes coblk00 (Colorado Dataset)	review not needed	U.S. Census blocks with selected attribute information.			Center for International Earth Science Information Network (CIESIN)	Yes	Not intended for use.	
CA Class II Development	Developable Area and Strata Unit Area	in review	This dataset represents the "most geologically prospective" area for oil shale and allowable leasing footprints for tar sand extraction in Special Tar Sands Areas.		(empty)	Argonne National Laboratory	Yes		
CA Class II Development	Photovoltaic Solar Resource	review finished	Monthly and annual average solar resource potential for 48 Contiguous United States utilizing a Direct Normal collection method.	NREL. 2008. Photovoltaic Solar Resource Map of the United States. National Renewable Energy Laboratory. http://www.nrel.gov/gis/data_analysis.html	rejected	NREL	Yes	Not intended for use.	
CA Class II Development	Dumps and landfills	review finished	Locations of landfills and waste transfer stations in 11 western states. Data was obtained from state and federal agencies in GIS, tabular, and map format.		accepted	USGS	Yes	This data set will be further evaluated in task three and compared against LU/LC data for accuracy and other proxy data sets.	While the data confidence rating for this data set is low, it represents the only data set of its kind. This data was created as part of the USGS Sagemap effort which helps add credibility despite the lack of documentation.
CA Class II Development	Energy Distribution Control Facilities	review finished	The Energy Distribution Control Facilities layer depicts the facilities which are responsible for balancing the load within their respective control areas. The proper functioning of these facilities is integral to the stability of the North American Elec		accepted	Global Energy Maps	Yes	Data not intended for use.	
CA Class II Development	Oil_Gas Potential EPCA 3	in review	inventory of all onshore Federal lands to identify: “the United States Geological Survey estimates of the oil and gas resources underlying these lands; and “the extent and nature of any restrictions or impediments to the development of	DOI. 2008. Inventory of Onshore Federal Oil and Natural Gas Resources and Restrictions to Their Development. Prepared by the U.S. Departments of the Interior, Agriculture and Energy. http://www.blm.gov/wo/st/en/prog/energy/oil_a	(empty)	BLM	No		

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
			the resources…"	nd_gas/EPCA_III.html					
CA Class II Development	FEMA Transmission Line Connectivity	review finished	NREL received this data from the Federal Emergency Management Agency (FEMA) sometime around 1993. It is our understanding that the data represents a schematic of transmission line connectivity.		rejected	FEMA	No	Not intended or applicable for use.	
CA Class II Development	Fixed-Guideway Transit Facilities (Line)	review not needed	Version 2004 of the Fixed-Guideway Transit Network is a network database of the nation's fixed-guideway transit systems.			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	Fixed-Guideway Transit Facilities (Stations)	review not needed	Version 2004 of the Fixed-Guideway Transit Network is a network database of the nation's fixed-guideway transit systems.			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	FM (zip) (07-31-2009)	in review	Extract of FM Radio StationTransmitter sites.			FCC Media Bureau	No	May be used in conjunction with BLM Linear Features maps, energy transmission and others to represent disturbance features on the landscape.	This data set requires metadata to be thematically and technically suitable for the intended use.
CA Class II Development	Freight Analysis Network	review not needed	"Freight Analysis Framework 2.2 Network Machine Readable Data Files" are distributed by the Federal Highway Administration Office of Freight Management and Operations, Operations Core Business Unit, Washington DC, 2007 and contains National Highway System			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	Gas pipelines	need to review	The U.S. Department of Transportation (U.S. DOT), Pipeline and Hazardous Materials Safety Administration (PHMSA) is working with other federal and state agencies and the pipeline industry to create a National Pipeline Mapping System (NPMS).		(empty)	U.S. Dept. of Transportation - Pipeline and Hazardous Materials	Yes		

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
						Safety Administration			
CA Class II Development	Groundwater well locations	need to review	groundwater well locations for residential houses to get at growth trends and patterns of rural development		(empty)				
CA Class II Development	Hazardous Material Routes	review not needed	The Federal Motor Carrier Safety Administration (FMCSA) Hazardous Material Routes were developed using the 2004 First Edition TIGER/Line files.			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	Highway Performance Monitoring System	review not needed	The Federal Highway Administration (FHWA) has the responsibility to assure that adequate highway transportation information is available to support its functions and responsibilities, including those of the Administration and the Congress.			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	Highway-Rail Grade Crossings	review not needed	FRA Grade Crossings is a spatial file that originates from the National Highway-Rail Crossing Inventory Program.			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	Intermodal Terminal Facilities	review not needed	This is a public dataset for the Department of Transportation, Research and Innovative Technology Administration's Bureau of Transportation Statistics.			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	Land Mobile - Broadcast (zip) (07-26-2009)	in review	Extract of Land Mobile Broadcast Service Transmitter sites.			FCC Media Bureau	No	May be used in conjunction with BLM Linear Features maps, energy transmission and others to represent disturbance features on the landscape.	This data set requires metadata to be thematically and technically suitable for the intended use.
CA Class II Development	Land Mobile - Commercial (zip) (07-26-2009)	in review	Extract of Land Mobile Commercial Service Transmitter sites.			FCC Media Bureau	No	May be used in conjunction with BLM Linear Features maps, energy transmission and others to represent disturbance features on the landscape.	This data set requires metadata to be thematically and technically suitable for the intended use.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CA Class II Development	Land Mobile - Private (zip) (07-26-2009)	in review	Extract of Land Mobile Private Service Transmitter sites.			FCC Media Bureau	No	May be used in conjunction with BLM Linear Features maps, energy transmission and others to represent disturbance features on the landscape.	This data set requires metadata to be thematically and technically suitable for the intended use.
CA Class II Development	LATITL	review finished	Monthly and annual average solar resource potential for 48 Contiguous United States utilizing a Flat Plate Tilted South at Latitude collection method.		rejected	NREL	Yes	Not intended for use.	
CA Class II Development	Market significant transmission lines in North America.	review finished	The Transmission Lines layer is a comprehensive layer consisting of market significant transmission lines in North America. Depicted lines are generally greater than 115 kV and tie major power plants to the electrical grid. Transmission lines are located		accepted	Global Energy Maps	Yes	This layer is intended to represent market significant electricyt transmission lines.	This layer is suitable for use however additional transmission line data is being sought.
CA Class II Development	Microwave (zip) (07-26-2009)	in review	Extract of Microwave Service sites.			FCC Media Bureau	No	May be used in conjunction with BLM Linear Features maps, energy transmission and others to represent disturbance features on the landscape.	This data set requires metadata to be thematically and technically suitable for the intended use.
CA Class II Development	National Bridge Inventory	review not needed	The NBI is a collection of information (database) covering the more than 600,000 bridges located on public roads, including Interstate Highways, U.S. highways, State and county roads, as well as publicly-accessible bridges on Federal lands.			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	National Highway Planning Network	review not needed	The National Highway Planning Network is a comprehensive network database of the nation's major highway system.			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	National Land Cover Dataset (NLCD)	review not needed				MRLC	Yes		
CA Class II Development	Natural Landcapes (Theobald 2010)	review finished		Theobald, D.M. 2010. Estimating changes in natural landscapes from 1992 to 2030 for the conterminous United States. Landscape Ecology 25(7): 999-1011.	accepted		Yes	These data are intended to be used for broad-scale assessments of ecological integrity and as an indication of human	Natural landscapes (Theobald 2010) is a multi-scale, integrated metric that incorporate national datasets on land cover, housing density, road existence, and highway traffic

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
								modification of landscapes.	volume to measure the dynamics of natural landscapes in the conterminous US. The NL metric is similar to other approaches that evaluate the effect of humans on natural landscapes such as the human footprint (Leu et al. 2008) in that it uses surrogate spatial data on land cover, population, and roads, as well as relying on heuristically derived estimates of human-dominated cover types. NL differs in that it is a simpler metric that has a direct physical interpretation related to proportion of natural cover at a location, examines the broader, landscape-scale pattern to differentiate the spatial context, and assumes that impacts decline continuously as a function of distance, rather than using abrupt buffers. NL also does not rely on pre-established critical scales and avoids the persistent problem of the arbitrariness of defining a patch. As such, this database is recommended as a summary or overview measure of human modification of landscapes, for the Development Change Agent.
CA Class II Development	NCEP Climate Datasets	need to review	geopotential height, u-wind,v-wind, vector wind, omega,air temperature, potential temperature, SST, specific hum, rel humidity, slp, surface pressure, precipitable water, precipitation rate,runoff, soil mositure, streamfunction, velocity potential, diverg			NCEP, NCAR			
CA Class II Development	Nighttime Lights of North America	review not needed	This map layer is an image of nighttime lights for North America, including the Caribbean and most of Mexico.			Defense Meteorological Satellite Program (DMSP)	Yes	At a national scale, Nighttime Lights is an adequate for representing urban areas on the US lanscape. However its resolution is too coarse for ecoregional use.	Not intended for use.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CA Class II Development	North American Atlas - Populated Places	review not needed	The North American Atlas - Populated Places data set shows a selection of named populated places suitable for use at a scale of 1:10,000,000.			USGS	Yes	Not intended for use.	
CA Class II Development	Oil and Gas Leases and Agreements	review finished	Shows federal current oil and gas leases, agreements, and lease sale parcels in the U.S on federal lands or where lands have been pooled with non-federal lands in the case of an agreement.		rejected	BLM	No	Need to reevaluate after metadata is obtained.	
CA Class II Development	Paging (zip) (07-26-2009)	in review	Extract of Paging Service Transmitter sites.			FCC Media Bureau	No	May be used in conjunction with BLM Linear Features maps, energy transmission and others to represent disturbance features on the landscape.	This data set requires metadata to be thematically and technically suitable for the intended use.
CA Class II Development	Potential Geothermal Area	review finished	This coverage shows the regions favorable for the discovery and shallow depth (less than 1000m) of thermal water of sufficient temperature for direct-heat applications.		rejected	Idaho National Engineering & Environmental Laboratory	Yes	Not intended for use.	
CA Class II Development	Public Use Airport Runways	review not needed	The Airport Runways database is a geographic dataset of runways in the United States and US territories containing information on the physical characteristics of the runways.			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	Public-Use Airports	review not needed	The Airports database is a geographic point database of aircraft landing facilities in the United States and U.S. Territories.			Bureau of Transportation Statistics	Yes	Not intended for use.	
CA Class II Development	Railroads	review finished	The North American Atlas - Railroads data set shows the railroads of North America at 1:10,000,000 scale.		rejected	USGS	Yes	Not intended for use.	
CA Class II Development	Railway Network (Line)	review finished	The Rail Network is a comprehensive database of the nation's railway system at the 1:100,000 scale.		accepted	Bureau of Transportation Statistics	Yes	This layer adequately represents the railway network at an ecoregional scale.	This layer is suitable for use.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CA Class II Development	Railway Network (Node)	review not needed	The Rail Network is a comprehensive database of the nation's railway system at the 1:100,000 scale.		(empty)	Bureau of Transportation Statistics	Yes	Not intended for use.	Not intended for use.
CA Class II Development	Section 368 Energy Corridors	review finished	Represents areas which have been proposed as West-wide energy corridors.	DOE & BLM. 2008. Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in the 11 Western States (DOE/EIS-0386).http://corridoreis.anl.gov/documents/fpeis/index.cfm	accepted	Argonne National Laboratory	Yes	This data belongs to a larger category of development change agents, specifically planned areas of electrical transmission. It will be used to represent areas of likely land use change and investment in energy infrastructure.	This data set is suitable for its intended purpose.
CA Class II Development	Significant Electric Power Generation Plants	need to review	The Electric Plants layer is a comprehensive representation of significant power plants within the North American power grid. The majority of plants shown are greater than three megawatts. Power plants are located using a mixture of sources from regional		(empty)	Global Energy Maps	Yes	Not intended for use.	Not intended for use.
CA Class II Development	Spatially Explicit Regional Growth Model (SERGoM) v1.2	review finished	SERGoM data uses US Census block housing units, protected lands, groundwater well density, and road accessibility to estimate housing density	U.S. Environmental Protection Agency (EPA; Bierwagen, B., D.M. Theobald, C.R. Pyke, A. Choate, P. Groth, J.V. Thomas, and P. Morefield). 2009 Land-Use Scenarios: National-Scale Housing-Density Scenarios Consistent with Climate Change Storylines. Global Change Research Program, National Center for Environmental Assessment, Washington, DC; EPA/600/R-08/076F. Bierwagen, B., D.M. Theobald, C.R. Pyke, A. Choate, P. Groth, J.V. Thomas, and P. Morefield. (In press, accepted 12 October 2010). Land-Use Scenarios: National-Scale Housing-Density Scenarios Consistent with Climate Change Storylines. Proceedings of the National Academy of Sciences. Theobald, D.M. 2005. Landscape patterns of exurban growth in the USA from 1980 to 2020. Ecology and Society 10(1): 32. [online] URL: http://www.ecologyandsociety.org/vol10/iss1/art32/.	accepted	Theobald and US EPA	Yes	Main layer of urban-to-rural patterns of development for Development Change Agent.	The ICLUS (Integrated Climate Land Use System) project has developed national scenarios of housing density that are logically consistent with IPCC emissions storylines. It uses a cohort-component methodology to represent population growth in the US. Spatial allocation is accomplished using SERGoM (4), a hierarchical (national to state to county), deterministic model that calculates the number of additional housing units needed in each county to meet the demand specified by population projections from the demographic model, based on the ratio of housing units to population (downscaled from census tract to block). Housing units are spatially allocated within a county in response to the spatial pattern of land ownership, previous growth patterns, and travel time

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
									accessibility. The model is dynamic in that as new urban core areas emerge, the model re-calculates travel time from these areas. SERGoM used refined land ownership, transportation, and groundwater well density using 2009 data, and by weighting housing units by NLCD 2001 cover types (Theobald 2005; US EPA 2009; Bierwagen et al. in press). Other datasets that are suggested for development change agent include SILVIS housing density and LANDSCAN, but these are not based on open source demographic/population projections and do include the detailed spatial data on land ownership, accessibility, and groundwater density to allocate housing units. They are based on block-group level allocation, whereas SERGoM is based on modified block-level (a finer grain dataset). The ICLUS/SERGoM layer is adequate for use in the REA.
CA Class II Development	Substations and Taps in North American Power Grid	need to review	The Substations layer is a comprehensive layer of the substations and taps that exist in the North American power grid. Substations are snapped into segments of the Transmission Lines layer and are found at every power plant. Substations are located using		(empty)	Global Energy Maps	Yes	Not intended for use.	
CA Class II Development	TIGER 2009 "edges" and roads	need to review	Comprehensive road layer for the ecoregion					TIGER line files and edges is used to represent linear development features such as roads. This layer may be used in BLM Linear Disturbance or USGS 1:24,000 DLG data is unavailable.	Generally not suitable but may be used as a backup.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CA Class II Development	Trails	review not needed	Have historic trails, Pacific Crest			BLM		Not intended for use. Trails will be represented with BLM Linear Disturbance maps.	
CA Class II Development	Travel management, OHV use	need to review			accepted				
CA Class II Development	TV - Digital (zip) (07-31-2009)	in review	Extract of NTSC Television StationTransmitter sites.		(empty)	FCC Media Bureau	No	May be used in conjunction with BLM Linear Features maps, energy transmission and others to represent disturbance features on the landscape.	This data set requires metadata to be thematically and technically suitable for the intended use.
CA Class II Development	TV - NTSC (zip) (07-31-2009)	in review	Extract of Digital Television StationTransmitter sites.		(empty)	FCC Media Bureau	No	May be used in conjunction with BLM Linear Features maps, energy transmission and others to represent disturbance features on the landscape.	This data set requires metadata to be thematically and technically suitable for the intended use.
CA Class II Development	U.S. Census Database, 1990	review not needed	This data set includes U.S. Census Bureau 1990 population information for the United States, presented by county.			Census	Yes	Not intended to be used directly. See SERGoM/ICLUS.	
CA Class II Development	U.S. Census Database, 2000	review not needed	This data set includes U.S. Census Bureau population information for the United States and Puerto Rico, presented by county.			Census	Yes	Not intended to be used directly. See SERGoM/ICLUS.	
CA Class II Development	Urban Areas of the United States	review not needed	This data set includes a selection of urban areas in the United States derived from the urban areas layer of the Digital Chart of the World (DCW).			USGS	Yes	Not intended for use.	
CA Class II Development	US Roads	review not needed	This data set portrays the major roads in the United States, Puerto Rico, and the U.S. Virgin Islands		rejected	USGS	Yes	Not intended for use.	
CA Class II Development	USFS National Visitor Use Monitoring	review finished			rejected	USDA Forest Service		These data are useful to understand broad-scale (Forests to regional) understanding of recreation use on Forest Service land, but are	This data is suitable as a reference source only.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
								limited for the spatial assessments for the REA because similar data are not available on BLM, NPS, and USFWS and other public lands. Also, it is difficult to extrapolate to a finer-scale that would be needed for the REAs.	
CA Class II Development	Water Use by County	review not needed	This map layer portrays the estimated use of water in counties in the United States, in the year 2000.			USGS	Yes	Not intended for use.	
CA Class II Development	Wildland Urban Interface	need to review	The Wildland-Urban Interface (WUI) is the area where houses meet or intermingle with undeveloped wildland vegetation.			SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin-Madison	Yes		
CA Class II Development	Known Geothermal Resource Areas, Geothermal Lease Status, Biomass Development Areas, Concentrating Solar Power, Flat plate collector solar resource data, wind power classes	need to review	Assessing The Potential For Renewable Energy On Public Lands Report (DOE/GO-102003-1704) GIS Datasets on CD-ROM available at listed website.			NREL and BLM	Yes		
CA Class II Development	50m Wind Potential	in review	Wind power potential for the states at a 50 meter height. This dataset will be replaced when the southwest region has been completed, and the data may change when this region has been completed.	NREL. 1986. Wind Energy Resource Atlas of the United States. National Renewable Energy Laboratory. http://rredc.nrel.gov/wind/pubs/atlas/		TrueWind Solutions/NREL	Yes		
CA Class II Development	Solar Energy Study Areas	review finished	This data represents Solar Energy Study Areas developed by the Bureau of Land Management for use in the Solar Energy Programmatic Environmental Impact		accepted	BLM	Yes	This data set represents solar energy areas that are most likely to be developed in the short	This data set is suitable for its intended purpose.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
			Statement (PEIS). The areas have been selected as being free of land use restrictions and for their suitability as sites for utility grade solar power plants. For details see the Solar Energy PEIS at http:\\solareis.anl.gov.					term.	
CA Class II Development	Mineral Resource Data System	in review	MRDS describes metallic and nonmetallic mineral resources throughout the world. It is a vector point file. Included are deposit name, location, commodity, deposit description, geologic characteristics, production, reserves, resources, and references. It includes the original MRDS and MAS/MILS data.		(empty)	USGS	Yes	This data set will represent relative impact by past mining activity.	Dataset may be the best available. Being point data this dataset lacks a spatial component that reflects the total surface footprint of a mine or mine processing site.
CA Class II Development	Ruby Pipeline	need to review	Spatial layer representing the 677-mile Ruby natural gas pipeline across Wyoming, Utah, Nevada, Oregon and California						
CA Class II Development	Wind resource map, mean annual wind speed at 80m height	need to review	The Department of Energy's Wind Program and the National Renewable Energy Laboratory (NREL) published a new wind resource map showing the predicted mean annual wind speeds at 80-m height.	AWS Truewind & NREL. 2009. Predicted mean annual wind speeds at 80-m height. AWS Truewind & National Renewable Energy Laboratory.http://www.windpoweringamerica.gov/index.asp		NREL			
CA Class II Development	Concentrated Solar Power Resource Maps	need to review	These direct-normal solar radiation maps filtered by solar resource, land availability and suitability. Identifies the most economically suitable lands available for deploying of large-scale concentrating solar power plants in the southwestern United States.	NREL. 2010. Concentrating Solar Power Resource Maps. http://www.nrel.gov/csp/maps.html		NREL			
CA Class II Development	current locations of private and state land renewable energy facilities	need to review	Current location and footprint of exisisting renewable energy facilities.						
CA Class II Development	Preliminary Geothermal Potential and Exploration in the Great Basin	review finished	This map provides regional information for assessing the potential for high-temperature (>150 deg. C) geothermal systems in the Great Basin- those most likely to be capable of producing electrical energy.	Zehner, R, M Coolbaugh, L Shevenell. 2009. Preliminary Geothermal Potential and Exploration Activity in the Great Basin. Nevada Bureau of Mines and Geology, University of Nevada, Reno.	accepted	Nevada Bureau of Mines and Geology	Yes	This layer will represent geothermal potential for the Central Great Basin and northern Mojave Basin areas.	The data is suitable for the intended use.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CA Class II Development	Geothermal leases	in review	Includes three sets of data: Geothermal leases closed, producing and nonproducing.			BLM	No		
CA Class II Development	Solar Energy Leases	in review				BLM	No		
CA Class II Development	Solid Mineral Leases	in review				BLM	No		
CA Class II Development	Wind Energy Leases	in review				BLM	No		
CA Class III Invasive Species	Annual Grass Index of Nevada (March 2006)	need to review	Arc Grid. 100% of Nevada plus edges of adjacent states. Currency of data: effectively spring 2004/2005. Scale at which data are believed to meet National Map Accuracy Standards: 1:100,000 in most areas. Recommended that the map presented here be interpreted as an annual grass index (ANGRIN) map, rather than an estimate of actual annual grass cover. Nevertheless, the ANGRIN map clearly reveals the pattern of annual grass invasion across Nevada.	Peterson, E. B. 2006. A map of invasive annual grasses in Nevada derived from multitemporal Landsat 5 TM imagery. Report for the U.S.D.I. Bureau of Land Management, Nevada State Office, Reno, by the Nevada Natural Heritage Program, Carson City, Nevada.	(empty)	Nevada Natural Heritage Program	No		
CA Class III Invasive Species	Wild Horse and Burro Herd Areas	need to review			(empty)	BLM			
CA Class III Invasive Species	Invasive Species Infestation location	in review	Polygon feature data set that depicts noxious weed distribution across the western united states. This data suports the noxious weed monitoring and training within the National Invasive Species Information Management System.		(empty)	BLM	Yes	Without species information, this data set may represent a general infestation level by weed species.	Need to clarify with BLM that this data set does not distinguish between species. There are relevent data fields that get at percent cover, extent, etc but nothing relating to species. Need to determine this before determining the intended use and suitability of the data set.
CA Class III Invasive Species	Invasive Species Survey Area	need to review	We didn't receive the data from BLM due to file corruption issues, so cannot assess. The Data source links lead to Geo-Energy web site, which doesn't make sense.		(empty)	BLM			

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CA Class III Invasive Species	Boundaries of Invasive Species Treatment Areas	need to review	Have not yet received the data from BLM due to data corruption issues.		(empty)	BLM			
CA Class III Invasive Species	Weed Management Areas	review finished	This data set represents BLM or perhaps multi-agency weed management areas.		(empty)	BLM	No	Use not clear. May be used as a reporting unit.	No metadata was recieved with this layer. The suitability may be acceptable if used solely as a reporting unit.
CA Class III Invasive Species	New Zealand Mudsnail Sightings Distribution: USGS NAS	review finished	This map layer is a compilation of confirmed New Zealand mudsnail sighting reports in the United States and Canada from 1987 through 2010 and is updated daily. It provides geographical and historical information to show distribution over space and time. Although it is updated daily it is dependent of reported confirmed sightings which may not be reported daily		accepted	USGS Nonindigenous Aquatic Species	Yes	Identified point locations of New Zealand mudsnail	This data has been evaluated and is suitable for use.
CA Class III Invasive Species	Zebra Mussel Locations: USGS NAS	review finished	Mapsite of reported Zebra Mussel locations in USA including our ecoregions. Although it is reported to be updated daily, it is dependent on those reporting zebra mussels to report to this mapping website.		accepted	USGS Nonindigenous Aquatic Species website	Yes	Identified point locations of zebra mussels.	This data has been evaluated and is suitable for use.
CA Class III Invasive Species	Quagga Mussel Distribution Map: USGS NAS	review finished	Map data of reported locations of quagga mussels		accepted	USGS Nonindigenous Aquatic Species website	Yes	Identified point locations of quagga mussels	This data has been evaluated and is suitable for use.
CA Class III Invasive Species	New Zealand mudsnail in the Western USA: Montana State U.	review finished	This db is superior to USGS NAS NZMS db but has not been updated since 2009. There are substanitally more point locations than USGS with more detailed descriptions		accepted	Montana State University	Yes	Identified point locations of New Zealand mudsnail	This data has been evaluated and is suitable for use.
CA Class III Invasive Species	USGS Nonindigenous Species database: USGS NAS bullfrog example	review finished	This is an example from our default aquatic invasive species database at the USGS NAS website. The website database has almost all of the aquatic invasives on our list, but I am not sure how 'up to date' it really is. The page source site links to is for bullfrogs and list occurances by states and HUCs. It also has a link to specfic reported locations. It wont be difficult to access all the vital info when the time comes		accepted	USGS	Yes	Identified point locations of aquatic nonindigenous species.	This data has been evaluated and is suitable for use.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
CA Class III Invasive Species	Didymo (Didymosphenia geminata) distribution map: USGS Fort Collins	review finished	This is a generalized map with dots indicating didymo presence. Dr. Sarah Spaulding who is the US leading expert on didymo is providing database coordinates that were used for this map and any updated locations. Dr. Spaulding is requesting funding from BLM to update the didymo database		accepted	USGS Fort Collins Science Center	Unknown	Identified point locations of didymo infestations	This data has been evaluated and is suitable for use.
CA Class III Invasive Species	Zebra mussel, quagga mussel and Asian clam veliger locations: EcoAnalysts, Moscow, ID	need to review	EcoAnalysts has just about completed an analysis of water samples collected from a few hundred sites for and by NVDOW that were examined for invasive mussel and clam veligers (tiny babies). At this time the data is considered 'confidential' without permission for use from NVDOW. If dataset looks promising we will ask for permission to use.			Nevada Department of Wildlife	Unknown	This multipurpose data set will provide fine filter information on non-native aquatic species	This data has been evaluated and is suitable for use.
CA Class III Invasive Species	Nevada Noxious Weeds Data	need to review				Nevada Natural Heritage Program			
CA Class III Invasive Species	Cheatgrass (Bromus tectorum) Estimated Percent Cover (December 2003)	need to review	The mapping method involved developing a statistical model for the estimation of B. tectorum cover at training plots with variables derived from Landsat 7 ETM+ satellite data satellite imagery and matching topographic data.	Peterson, E. B. 2003. Mapping Percent-Cover of the Invasive Species Bromus tectorum (Cheatgrass) over a Large Portion of Nevada from Satellite Imagery. Report for the U.S. Fish and Wildlife Service, Nevada State Office, Reno, by the Nevada Natural Heritage Program, Carson City.		Nevada Natural Heritage Program	Yes		
CA Class III Invasive Species	SWEMP--Southwest Exotic Plant Mapping Project	in review	The database represents the known point locations of non-native invasive plant infestations within Arizona and New Mexico, and adjacent portions of California, Colorado, Nevada and Utah. These data, collected from 1911 to 2006. Data includes all counties in NV, UT, and CO, and the 5 southern counties of CA.	Paxton, E.H., M. Sogge, T. Theimer, J. Girard, & P. Keim. 2008. Relevant Invasive Species Program Goals and Invasive Species Related Highlights & Key Findings and Accomplishments. USGS pub?		Arizona Heritage Program	Yes	Degree of conversion by invasive species to assess the amount of stress on natural ecosystems	High
CA Class III Invasive Species	Nevada Cheatgrass Project	in review	Point location with presence/absence for Bromus tectorum in Central Nevada	Bradley, B.A., and J.F. Mustard, "Characterizing the Landscape Dynamics of an Invasive Plant and Risk of Invasion Using Remote Sensing", Ecological Applications, 16(3), 1132-1147, 2006 1. Brte_NV.shp 2006-11-8 12:14, uploaded by Bethany Bradley on November 8th, 2006 Bradley, B.A., and J.F. Mustard. 2005. Remote Sensing of					

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
				Environment. 94, 204-213					
CA Class IV Climate Change	DayMet	review not needed			(empty)	Oak Ridge National Lab	Yes		
CA Class IV Climate Change	800 m PRISM Monthly Precipitation	need to review				Oregon State	Yes		
CA Class IV Climate Change	Bioclimate Classes: Thermotype and Ombrotype	review not needed	Isobioclimates were generated by combining the thermotypes (warm/cold) and ombrotype (dry/wet gradients) climate classes produced from the Rivas-Martínez method based on the concept of a quantifiable classification system which would closely relate the di			USGS	Yes		
PL Class I Sites of High Biodiversity	Nevada priority conservation areas	need to review	Areas identified through field inventory by the state Natural Heritage Program			Nevada Natural Heritage Program			
PL Class I Sites of High Biodiversity	TNC Ecoregional Assessment - 2010	review finished	Relative Conservation Value as documented by the 2010 updated Mojave Desert ecoregional assessment of The Nature Conservancy	Randall, J.M. SS. Parker, J. Moore, B. Cohen, L. Crane, B. Christian, D. Cameron, J. MacKenzie, K. Klausmeyer and S. Morrison. 2010. Mojave Desert Ecoregional Assessment. Unpublished Report. The NatureConcervancy, San Francisco, California. 106 pages + appendices. Available at http://conserveonline.org/workspaces/mojave/documents/mojave-desert-ecoregional-2010/@@view.html	accepted	The Nature Conservancy (NV, CA, AZ)	Yes	Potential use as assessment units; i.e., current and future conditions relative to these selected landscapes of biodiversity significance.	Suitable for this use. See updated version from Mojave (2010).
PL Class I Sites of High Biodiversity	Audubon Important Bird Areas					Audubon			
PL Class I Sites of High Biodiversity	Important Bird Areas - American Bird Conservancy	need to review				American Bird Conservancy			

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
PL Class I Sites of High Biodiversity	TNC Portfolio Sites	review finished	Portfolio sites identified through ecoregional plans of TNC from late 1990s-early 2000s.	for CBR: Nachlinger, J., K. Sochi, P. Comer, G. Kittel, and D. Dorfman. 2001. Great Basin: an ecoregion-based conservation blueprint. The Nature Conservancy, Reno, NV. 160 pp. + appendices. For MBR: Moore, J., C. Rumsey, T. Knight, J. Nachlinger, P. Comer, D. Dorfman, and J. Humke. 2001. Mojave Desert: an ecoregion-based conservation blueprint. The Nature Conservancy, Las Vegas, NV. 150 pp. + appendices.	accepted	The Nature Conservancy			
PL Class II Specially Designated Areas of Ecological Value	ACEC		will derived from BLM directly		(empty)	BLM			
PL Class II Specially Designated Areas of Ecological Value	Wild Horse and Burro Herd Management Areas	need to review			accepted	BLM			
PL Class II Specially Designated Areas of Ecological Value	National Inventoried Roadless Areas (IRAs)	need to review	This dataset contains all National Forest Inventoried Roadless Areas (IRAs) for the lower 48 states, including Puerto Rico.			USDA	Yes		
PL Class II Specially Designated Areas of Ecological Value	BLM National landscape Conservation System (NLCS)	review finished	The Bureau of Land Management's National Landscape Conservation System (NLCS) contains some of the West's most spectacular landscapes. It includes over 886 federally recognized areas and approximately 27 million acres of National Monuments, National Conservation Areas, Wilderness Areas, Wilderness Study Areas, Wild and Scenic Rivers, National Scenic and Historic Trails, and Conservation Lands of the California Desert.		(empty)	BLM	Yes	Suitable for reference only. Not suitable for analysis.	
PL Class II Specially Designated Areas of	Protected Areas Database (PAD) (BLM version)	review finished	Review BLM PAD. The Protected Areas Database of the United States (PAD-US) is a digital map of steward boundaries that combines attributes of ownership,		(empty)	USGS	Yes	This data set is intended to identify designated areas of high biodiversity value and other managed	This data set is recommended for display or reference use only.

Primary Data Class	Dataset Name	Review Status	Data Description	Citation	Data Status After Review	Source Agency	Meta data	Intended Use of Data	Suitability for Intended Uses
Ecological Value			management, and a measure of intent to manage for biodiversity.					lands for the ecoregion.	
PL Class III Other Managed Lands	Livestock Grazing Allotments	in review	Grazing allotments and pastures by ecoregion		(empty)	BLM	No	This data may be linked to additional grazing data provided by the NOC. Otherwise will be treated as a reporting unit only.	The data is suitable as a reporting unit however the AMT has indicated that there are likely spatial errors in the dataset. The NOC may replace this or recommend another data set in the future.
PL Class III Other Managed Lands	BLM Admin Boundaries	review finished			accepted	BLM	Yes	Fine for reference purposes.	
PL Class III Other Managed Lands	Common Land Unit	review not needed	NO LONGER ACCESIBLE SINCE 2008 PER BLM. A Common Land Unit (CLU) is the smallest unit of land that has a permanent, contiguous boundary, a common land cover and land management, a common owner and a common producer in agricultural land associated with USDA farm programs. CLU boundaries are delineated from relatively permanent features such as fence lines, roads, and/or waterways.		(empty)	NRCS			
PL Class III Other Managed Lands	Counties	review not needed	County clip by ecoregion		accepted	BLM	No	This data is intended as reference only	The data is suitable for reference only.
PL Class III Other Managed Lands	Land Use Planning Boundaries	in review			(empty)	BLM	Yes	The data will be used as reporting or reference units.	This data is suitable for the intended use.

Appendix II. Coarse-filter Conservation Elements for the Mojave Basins and Ranges REA

Ecoregion Model Group	Land Cover Class	Conservation Element Name	Percent of Ecoregion	# of Field Referenced Samples	Vegetation Dynamics Models LANDFIRE	Vegetation Dynamics Models TNC NV	NatureServe Ecological Integrity Criteria 2008	NatureServe Ecological Integrity Criteria 2000
Montane Dry	Evergreen Forest and Woodland	Great Basin Pinyon-Juniper Woodland	1.9%	360	yes	yes		yes
Montane Dry	Tall Shrubland	Mogollon Chaparral	0.5%	48	yes			
Montane Dry	Tall Shrubland	Sonora-Mojave Semi-Desert Chaparral	0.2%	19	yes	yes		
Basin Dry	Short Shrubland	Sonora-Mojave Creosotebush-White Bursage Desert Scrub	33.8%	983	yes	yes		
Basin Dry	Short Shrubland	Mojave Mid-Elevation Mixed Desert Scrub	32.5%	1103	yes	yes		
Basin Dry	Sparsely Vegetated	North American Warm Desert Pavement	8.8%	65				
Basin Dry	Sparsely Vegetated	North American Warm Desert Bedrock Cliff and Outcrop	2.4%	309			yes	
Basin Dry	Short Shrubland	Sonoran Mid-Elevation Desert Scrub	2.2%	75	yes	yes		
Basin Dry	Short Shrubland	Sonora-Mojave Mixed Salt Desert Scrub	1.7%	123	yes	yes		yes
Basin Dry	Sparsely Vegetated	North American Warm Desert Badland	1.0%	12				
Basin Dry	Short Shrubland	Great Basin Xeric Mixed Sagebrush Shrubland	0.7%	8	yes	yes		yes
Basin Dry	Sparsely Vegetated	North American Warm Desert Active and Stabilized Dune	0.2%	16			yes	yes
Basin Dry	Short Shrubland	Inter-Mountain Basins Mixed Salt Desert Scrub	0.1%	79	yes	yes		yes
Montane Wet	Woody Wetlands and Riparian	North American Warm Desert Lower Montane Riparian Woodland and Shrubland/Stream	0.0%	26				yes
Basin Wet	Sparsely Vegetated	North American Warm Desert Playa	4.5%	133			yes	
Basin Wet	Short Shrubland	North American Warm Desert Wash	1.5%	99		yes		
Basin Wet	Aquatic	Mojave Desert Lake/Reservoir	0.6%					
Basin Wet	Woody Wetlands and Riparian	North American Warm Desert Riparian Woodland and Shrubland/Stream	0.2%	18				yes
Basin Wet	Woody Wetlands and Riparian	North American Warm Desert Riparian Mesquite Bosque	0.0%	10				
Basin Wet	Herbaceous Wetlands	North American Arid West Emergent Marsh and Pond	0.0%	26		yes	yes	yes
Basin Wet	Aquatic	Mojave Desert Springs and Seeps	0.0%					
Basin Wet	Woody Wetlands and Riparian	Sonoran Fan Palm Oasis/Stream	0.0%	1				

Appendix III: Current Draft of Fine-Filter Conservation Elements for the Mojave Basin and Ranges REA

Ecoregion Model Group	Taxonomic Group	Common_Name	Scientific Name	Federally Listed	State Protected	Rounded Global Rank	Relevant SWAPs	Relevant BLM Special Status	NatureServe Climate Vulnerability Index	# of Natural Heritage Locations	Available GAP Habitat Models	Other Spatial Data
Dry	Amphibians	Inyo Mountains Salamander	Batrachoseps campi	No	No	G2	CA	CA		19	CA	No
Dry	Amphibians	Desert Slender Salamander	Batrachoseps major aridus	Yes	Yes	T1	CA	CA				No
Dry	Amphibians	Kern Plateau Salamander	Batrachoseps robustus	No	No	G2	CA			10		No
Dry	Amphibians	Tehachapi Slender Salamander	Batrachoseps stebbinsi	No	Yes	G2	CA	CA		7		No
Dry	Amphibians	Colorado River Toad	Bufo alvarius	No	No	G5	CA			1	SW	No
Dry	Amphibians	Western Toad	Bufo boreas	No	Yes	G4	UT	UT			SW, CA	No
Dry	Amphibians	Arroyo Toad	Bufo californicus	Yes	No	G2	CA			5		Yes
Dry	Amphibians	Great Plains Toad	Bufo cognatus	No	Yes	G5	NV, UT	UT	PS		SW, CA	No
Dry	Amphibians	Black Toad	Bufo exsul	No	Yes	G1	CA	CA		1		No
Dry	Amphibians	Arizona Toad	Bufo microscaphus	No	Yes	G3	AZ, NV, UT	UT	PS	101	SW, CA	No
Dry	Amphibians	Amargosa Toad	Bufo nelsoni	No	Yes	G2	NV		PS	23	SW	No
Dry	Amphibians	Yellow-blotched Salamander	Ensatina eschscholtzii croceator	No	No	T2	CA	CA		5		No
Dry	Amphibians	Mount Lyell Salamander	Hydromantes platycephalus	No	No	G3	CA			3	CA	No
Dry	Amphibians	Owens Valley Web-toed Salamander	Hydromantes sp. 1	No	No	G1	CA			2		No
Dry	Amphibians	Canyon Treefrog	Hyla arenicolor	No	No	G5	AZ, UT			7	SW	No
Dry	Amphibians	Pacific Chorus Frog	Pseudacris regilla	No	No	G5	AZ, UT			52	SW, CA	No
Dry	Amphibians	Foothill Yellow-legged Frog	Rana boylii	No	No	G3	CA	CA			CA	No
Dry	Amphibians	California Red-legged Frog	Rana draytonii	Yes	No	G2	CA			2		Yes
Dry	Amphibians	Relict Leopard Frog	Rana onca	Yes	Yes	G1	AZ, NV, UT		MV	17	SW	No
Dry	Amphibians	Sierra Nevada Yellow-legged Frog	Rana sierrae	No	No	G1	NV		PS	2		No
Dry	Amphibians	Couch's Spadefoot	Scaphiopus couchii	No	No	G5	CA	CA			SW, CA	No
Dry	Amphibians	New Mexico Spadefoot	Spea multiplicata	No	No	G5	UT				SW	No
Dry	Ants, Wasps, & Bees	Mojave Gypsum Bee	Andrena balsamorhizae	No	No	G2				25		No
Dry	Ants, Wasps, & Bees	A Chrysidid Wasp	Ceratochrysis gracilis	No	No	G1				1		No
Dry	Ants, Wasps, & Bees	Menke's Chrysidid Wasp	Ceratochrysis menkei	No	No	G1				1		No
Dry	Ants, Wasps, & Bees	Redheaded Sphecid Wasp	Eucerceris ruficeps	No	No	G2				1		No
Dry	Ants, Wasps, & Bees	An Ant	Lasius nevadensis	No	No	G1				1		No
Dry	Ants, Wasps, & Bees	Red-tailed Blazing Star Bee	Megandrena mentzeliae	No	No	G2				39		No
Dry	Ants, Wasps, & Bees	An Ant	Neivamyrmex nyensis	No	No	G1				1		No
Dry	Ants, Wasps, & Bees	A Cleptoparasitic Bee	Paranomada californica	No	No	G1				2		No
Dry	Ants, Wasps, & Bees	Borrego Parnopes Chrysidid Wasp	Parnopes borregoensis	No	No	G1				1		No
Dry	Ants, Wasps, & Bees	Big-headed Perdita	Perdita cephalotes	No	No	G2				3		No
Dry	Ants, Wasps, & Bees	Mojave Poppy Bee	Perdita meconis	No	No	G2				17		No
Dry	Ants, Wasps, & Bees	A Cleptoparasitic Bee	Rhopalolemma robertsi	No	No	G1				1		No
Dry	Birds	Cooper's Hawk	Accipiter cooperii	No	Yes	G5	CA			8	SW, CA	No
Dry	Birds	Northern Goshawk	Accipiter gentilis	No	Yes	G5	CA, NV, UT	CA, UT	MV	6	SW, CA	No
Dry	Birds	Sharp-shinned Hawk	Accipiter striatus	No	Yes	G5	CA				SW, CA	No

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Dry	Birds	White-throated Swift	Aeronautes saxatalis	No	Yes	G5	NV					No
Dry	Birds	Tricolored Blackbird	Agelaius tricolor	No	Yes	G2	CA, NV	CA	PS	10	SW, CA	No
Dry	Birds	Grasshopper Sparrow	Ammodramus savannarum	No	Yes	G5	AZ, CA, UT	UT		1	SW, CA	No
Dry	Birds	American Pipit	Anthus rubescens	No	Yes	G5	AZ					No
Dry	Birds	Golden Eagle	Aquila chrysaetos	No	Yes	G5	CA	CA, UT		4	SW, CA	No
Dry	Birds	Short-eared Owl	Asio flammeus	No	Yes	G5	CA, NV, UT	UT	PS	2	SW, CA	No
Dry	Birds	Long-eared Owl	Asio otus	No	Yes	G5	CA			9	SW, CA	No
Dry	Birds	Burrowing Owl	Athene cunicularia	No	Yes	G4	CA, UT	CA, UT		180	SW, CA	No
Dry	Birds	Western Burrowing Owl	Athene cunicularia hypugaea	No	Yes	T4	NV	AZ	PS	6		Yes
Dry	Birds	Verdin	Auriparus flaviceps	No	Yes	G5	NV					No
Dry	Birds	Oak Titmouse	Baeolophus inornatus	No	No	G5	CA				CA	No
Dry	Birds	Ferruginous Hawk	Buteo regalis	No	Yes	G4	AZ, CA, NV, UT	UT	PS	15	SW	No
Dry	Birds	Swainson's Hawk	Buteo swainsoni	No	Yes	G5	CA, NV	CA	PS	15	SW, CA	No
Dry	Birds	Common Black-Hawk	Buteogallus anthracinus	No	Yes	G4	AZ			5	SW	Yes
Dry	Birds	Gambel's Quail	Callipepla gambelii	No	Yes	G5	UT				SW, CA	No
Dry	Birds	Costa's Hummingbird	Calypte costae	No	Yes	G5	CA, NV		IL	7	SW, CA	No
Dry	Birds	Northern Cardinal	Cardinalis cardinalis	No	Yes	G5	CA			2	SW	No
Dry	Birds	Turkey Vulture	Cathartes aura	No	Yes	G5				3	SW, CA	No
Dry	Birds	Swainson's Thrush	Catharus ustulatus	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Vaux's Swift	Chaetura vauxi	No	Yes	G5	CA				CA	No
Dry	Birds	Western Snowy Plover	Charadrius alexandrinus nivosus	No	Yes	T3	AZ, CA, NV		MV	5		No
Dry	Birds	Mountain Plover	Charadrius montanus	Yes	Yes	G3	AZ, CA, UT	AZ, CA, UT		7	SW	No
Dry	Birds	Lark Sparrow	Chondestes grammacus	No	Yes	G5	CA				SW, CA	No
Dry	Birds	Lesser Nighthawk	Chordeiles acutipennis	No	Yes	G5				7	SW, CA	No
Dry	Birds	Northern Harrier	Circus cyaneus	No	Yes	G5	AZ, CA			1	SW, CA	No
Dry	Birds	Marsh Wren	Cistothorus palustris	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Evening Grosbeak	Coccothraustes vespertinus	No	Yes	G5	AZ			1	SW, CA	No
Dry	Birds	Yellow-billed Cuckoo	Coccyzus americanus	Yes	Yes	G5	UT	UT		10	SW, CA	No
Dry	Birds	Western Yellow-billed Cuckoo	Coccyzus americanus occidentalis	Yes	Yes	T3	AZ, CA, NV	CA	MV	45		No
Dry	Birds	Gilded Flicker	Colaptes chrysoides	No	Yes	G5	CA	CA			SW	No
Dry	Birds	Inca Dove	Columbina inca	No	Yes	G5				1	SW, CA	No
Dry	Birds	Dusky Grouse	Dendragapus obscurus	No	Yes	G5	AZ, NV					No
Dry	Birds	Grace's Warbler	Dendroica graciae	No	Yes	G5	NV					No
Dry	Birds	Black-throated Gray Warbler	Dendroica nigrescens	No	Yes	G5	UT				SW, CA	No
Dry	Birds	Hermit Warbler	Dendroica occidentalis	No	Yes	G4	CA, NV				SW, CA	No
Dry	Birds	A Yellow Warbler	Dendroica petechia brewsteri	No	No	T3	CA			11		No
Dry	Birds	Sonoran Yellow Warbler	Dendroica petechia sonorana	No	No	T2	CA			1		No
Dry	Birds	Cape May Warbler	Dendroica tigrina	No	Yes	G5				1		No

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Dry	Birds	Bobolink	Dolichonyx oryzivorus	No	Yes	G5	NV, UT	UT	PS	1	SW	No
Dry	Birds	White-tailed Kite	Elanus leucurus	No	Yes	G5	CA	CA			SW, CA	No
Dry	Birds	Willow Flycatcher	Empidonax traillii	Yes	Yes	G5	CA			3	SW, CA	Yes
Dry	Birds		Empidonax traillii brewsteri	No	Yes	T3	CA, NV				SW, CA, species level	No
Dry	Birds	Southwestern Willow Flycatcher	Empidonax traillii extimus	Yes	Yes	T1	AZ, CA, NV, UT	CA	PS	48		No
Dry	Birds	California Horned Lark	Eremophila alpestris actia	No	No	T3	CA			3		No
Dry	Birds	Merlin	Falco columbarius	No	Yes	G5	CA			1	SW	No
Dry	Birds	Prairie Falcon	Falco mexicanus	No	Yes	G5	CA			146	SW, CA	No
Dry	Birds	Peregrine Falcon	Falco peregrinus	No	Yes	G4	NV, UT		PS	52	SW, CA	No
Dry	Birds	American Peregrine Falcon	Falco peregrinus anatum	No	Yes	T4	AZ, CA			39		Yes
Dry	Birds	Common Moorhen	Gallinula chloropus	No	Yes	G5				2	SW	No
Dry	Birds	Greater Roadrunner	Geococcyx californianus	No	Yes	G5				2	SW, CA	No
Dry	Birds	Common Yellowthroat	Geothlypis trichas	No	Yes	G5				10	SW, CA	No
Dry	Birds	California Condor	Gymnogyps californianus	Yes	Yes	G1	AZ, CA, UT			2	SW, CA	No
Dry	Birds	Bald Eagle	Haliaeetus leucocephalus	No	Yes	G5	AZ, CA, NV, UT	CA, UT	PS	17	SW, CA	No
Dry	Birds	Yellow-breasted Chat	Icteria virens	No	Yes	G5	CA			24	SW, CA	No
Dry	Birds	Hooded Oriole	Icterus cucullatus	No	Yes	G5				3	SW, CA	No
Dry	Birds	Scott's Oriole	Icterus parisorum	No	Yes	G5	NV		PS		SW, CA	No
Dry	Birds	Mississippi Kite	Ictinia mississippiensis	No	Yes	G5	AZ			1	SW	No
Dry	Birds	Gray-headed Junco	Junco hyemalis caniceps	No	No	T5	CA			8		No
Dry	Birds	Loggerhead Shrike	Lanius ludovicianus	No	Yes	G4	CA, NV		IL	4	SW, CA	No
Dry	Birds	California Black Rail	Laterallus jamaicensis coturniculus	No	Yes	T1	AZ, CA	CA			SW, species level	No
Dry	Birds	Hooded Merganser	Lophodytes cucullatus	No	Yes	G5					SW	No
Dry	Birds	Red Crossbill	Loxia curvirostra	No	Yes	G5					SW, CA	No
Dry	Birds	Acorn Woodpecker	Melanerpes formicivorus	No	Yes	G5				1	SW, CA	No
Dry	Birds	Lewis's Woodpecker	Melanerpes lewis	No	Yes	G4	AZ, CA, NV, UT	UT	PS	2	SW, CA	No
Dry	Birds	Gila Woodpecker	Melanerpes uropygialis	No	Yes	G5	CA	CA		6	SW, CA	No
Dry	Birds	Lincoln's Sparrow	Melospiza lincolnii	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Elf Owl	Micrathene whitneyi	No	Yes	G5	CA	CA		6	SW, CA	No
Dry	Birds	Brown-crested Flycatcher	Myiarchus tyrannulus	No	Yes	G5	CA			7	SW, CA	No
Dry	Birds	Painted Redstart	Myioborus pictus	No	Yes	G5				1	SW	No
Dry	Birds	Clark's Nutcracker	Nucifraga columbiana	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Kentucky Warbler	Oporornis formosus	No	Yes	G5				1		No
Dry	Birds	MacGillivray's Warbler	Oporornis tolmiei	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Mountain Quail	Oreortyx pictus	No	Yes	G5	NV		PS	1	SW, CA	No
Dry	Birds	Orange-crowned Warbler	Oreothlypis celata	No	Yes	G5	AZ				SW, CA	No

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Dry	Birds	Savannah Sparrow	Passerculus sandwichensis	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Blue Grosbeak	Passerina caerulea	No	Yes	G5				22	SW, CA	No
Dry	Birds	Indigo Bunting	Passerina cyanea	No	Yes	G5	AZ				SW	No
Dry	Birds	Band-tailed Pigeon	Patagioenas fasciata	No	Yes	G4	UT			16	SW, CA	No
Dry	Birds	Phainopepla	Phainopepla nitens	No	Yes	G5	NV		PS	28	SW, CA	No
Dry	Birds	Black-billed Magpie	Pica hudsonia	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	White-headed Woodpecker	Picoides albolarvatus	No	Yes	G4	CA, NV				SW, CA	No
Dry	Birds	American Three-toed Woodpecker	Picoides dorsalis	No	Yes	G5	AZ, UT	UT				No
Dry	Birds	Nuttall's Woodpecker	Picoides nuttallii	No	No	G5	CA				CA	No
Dry	Birds	Downy Woodpecker	Picoides pubescens	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Ladder-backed Woodpecker	Picoides scalaris	No	Yes	G5				2	SW, CA	No
Dry	Birds	Abert's Towhee	Pipilo aberti	No	Yes	G3	CA, NV, UT		IL	12	SW, CA	No
Dry	Birds	Green-tailed Towhee	Pipilo chlorurus	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Inyo California Towhee	Pipilo crissalis eremophilus	Yes	Yes	T1	CA	CA		74		No
Dry	Birds	Hepatic Tanager	Piranga flava	No	Yes	G5	CA			8	SW	No
Dry	Birds	Summer Tanager	Piranga rubra	No	Yes	G5	CA			15	SW, CA	No
Dry	Birds	Black-tailed Gnatcatcher	Polioptila melanura	No	Yes	G5	CA			8	SW, CA	No
Dry	Birds	Purple Martin	Progne subis	No	Yes	G5	AZ, CA			1	SW, CA	No
Dry	Birds	Vermilion Flycatcher	Pyrocephalus rubinus	No	Yes	G5	CA			14	SW	No
Dry	Birds	Ruby-crowned Kinglet	Regulus calendula	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Golden-crowned Kinglet	Regulus satrapa	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Black Phoebe	Sayornis nigricans	No	Yes	G5	NV		IL	3	SW, CA	No
Dry	Birds	Rufous Hummingbird	Selasphorus rufus	No	Yes	G5	CA, NV					No
Dry	Birds	Allen's Hummingbird	Selasphorus sasin	No	Yes	G5	CA				SW, CA	No
Dry	Birds	Pygmy Nuthatch	Sitta pygmaea	No	Yes	G5					SW, CA	No
Dry	Birds	Red-naped Sapsucker	Sphyrapicus nuchalis	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Williamson's Sapsucker	Sphyrapicus thyroideus	No	Yes	G5	UT			1	SW, CA	No
Dry	Birds	Lawrence's Goldfinch	Spinus lawrencei	No	Yes	G3	CA				SW, CA	No
Dry	Birds	Lesser Goldfinch	Spinus psaltria	No	Yes	G5					SW, CA	No
Dry	Birds	Black-chinned Sparrow	Spizella atrogularis	No	Yes	G5	CA, NV					No
Dry	Birds	Chipping Sparrow	Spizella passerina	No	Yes	G5	CA				SW, CA	No
Dry	Birds	Spotted Owl	Strix occidentalis	No	Yes	G3				7	SW, CA	Yes
Dry	Birds	Mexican Spotted Owl	Strix occidentalis lucida	Yes	Yes	T3	AZ, UT			2		Yes
Dry	Birds	Tree Swallow	Tachycineta bicolor	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Bendire's Thrasher	Toxostoma bendirei	No	Yes	G4	CA, NV, UT	CA	PS	57	SW, CA	Yes
Dry	Birds	Crissal Thrasher	Toxostoma crissale	No	Yes	G5	CA, NV, UT		IL	20	SW, CA	No
Dry	Birds	Le Conte's Thrasher	Toxostoma lecontei	No	Yes	G4	AZ, CA, NV	CA	PS	157	SW, CA	No
Dry	Birds	California Thrasher	Toxostoma redivivum	No	No	G5	CA				CA	No
Dry	Birds	Winter Wren	Troglodytes troglodytes	No	Yes	G5	AZ				SW, CA	No
Dry	Birds	Cassin's Kingbird	Tyrannus vociferans	No	Yes	G5				1	SW, CA	No

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Dry	Birds	Lucy's Warbler	Vermivora luciae	No	Yes	G5	CA, NV, UT	CA	PS	1	SW, CA	No
Dry	Birds	Virginia's Warbler	Vermivora virginiae	No	Yes	G5	CA, NV, UT		PS	4	SW, CA	No
Dry	Birds	Bell's Vireo	Vireo bellii	Yes	Yes	G5	UT			3	SW, CA	No
Dry	Birds	Arizona Bell's Vireo	Vireo bellii arizonae	No	Yes	T4	CA, NV	CA	PS	8		No
Dry	Birds	Least Bell's Vireo	Vireo bellii pusillus	Yes	Yes	T2	CA	CA		14		Yes
Dry	Birds	Gray Vireo	Vireo vicinior	No	Yes	G4	CA, NV, UT	CA	PS	28	SW, CA	No
Dry	Birds	White-winged Dove	Zenaida asiatica	No	Yes	G5				1	SW, CA	No
Dry	Birds	White-crowned Sparrow	Zonotrichia leucophrys	No	Yes	G5	AZ				SW, CA	No
Dry	Butterflies & Skippers	Desert Green Hairstreak	Callophrys comstocki	No	No	G2				1		No
Dry	Butterflies & Skippers	Square-dotted Blue	Euphilotes battoides	Yes	No	G5						No
Dry	Butterflies & Skippers	Mcneill's Saltbush Sootywing	Hesperopsis gracielae	No	No	G2		AZ		3		No
Dry	Butterflies & Skippers	San Emigdio Blue	Plebulina emigdionis	No	No	G2				5		No
Dry	Butterflies & Skippers	Carol's Fritillary	Speyeria carolae	No	No	G2				40		No
Dry	Butterflies & Skippers	Nokomis Fritillary	Speyeria nokomis	No	No	G3				2		No
Dry	Grasshoppers	Desert Monkey Grasshopper	Psychomastax deserticola	No	No	G1				2		No
Dry	Katydids & Crickets	Kelso Jerusalem Cricket	Ammopelmatus kelsoensis	No	No	G1				1		No
Dry	Katydids & Crickets	Kelso Giant Sand Treader Cricket	Macrobaenetes kelsoensis	No	No	G1				1		No
Dry	Katydids & Crickets	Coachella Giant Sand Treader Cricket	Macrobaenetes valgum	No	No	G1				5		No
Dry	Katydids & Crickets	Coachella Valley Jerusalem Cricket	Stenopelmatus cahuilaensis	No	No	G1				1		No
Dry	Mammals	Nelson's Antelope Squirrel	Ammospermophilus nelsoni	No	Yes	G2	CA	CA		1	CA	No
Dry	Mammals	Pallid Bat	Antrozous pallidus	No	Yes	G5	CA	CA		77	SW	No
Dry	Mammals	Ringtail	Bassariscus astutus	No	No	G5	NV		PS	3	SW, CA	No
Dry	Mammals	Pygmy Rabbit	Brachylagus idahoensis	No	Yes	G4	CA, NV, UT	CA, UT	EV	1	SW, CA	No
Dry	Mammals	Dulzura California Pocket Mouse	Chaetodipus californicus femoralis	No	No	T3	CA			1		No
Dry	Mammals	Northwestern San Diego Pocket Mouse	Chaetodipus fallax fallax	No	No	T3	CA			10		No
Dry	Mammals	Pallid San Diego Pocket Mouse	Chaetodipus fallax pallidus	No	No	T3	CA			45		No
Dry	Mammals	Desert Pocket Mouse	Chaetodipus penicillatus	No	No	G5	NV		MV	3	SW, CA	No
Dry	Mammals	Mexican Long-tongued Bat	Choeronycteris mexicana	No	Yes	G4	AZ, CA			1	SW	No
Dry	Mammals	Townsend's Big-eared Bat	Corynorhinus townsendii	No	Yes	G4	CA, NV, UT	CA, UT	PS	124	SW	No
Dry	Mammals	Pale Lump-nosed Bat	Corynorhinus townsendii pallescens	No	Yes	T4				20		Yes
Dry	Mammals	Utah Prairie Dog	Cynomys parvidens	Yes	Yes	G1	UT			28	SW	No
Dry	Mammals	Desert Kangaroo Rat	Dipodomys deserti	No	No	G5	NV, UT		PS	8	SW, CA	No
Dry	Mammals	Merriam's Kangaroo Rat	Dipodomys merriami	Yes	No	G5				9	SW, CA	No
Dry	Mammals	Earthquake Merriam's Kangaroo Rat	Dipodomys merriami collinus	No	No	T1	CA			2		No
Dry	Mammals	Panamint Kangaroo Rat	Dipodomys panamintinus	No	No	G5	NV			1	SW, CA	No
Dry	Mammals	Argus Mountains Kangaroo Rat	Dipodomys panamintinus argusensis	No	No	T2	CA			4		No
Dry	Mammals	Panamint Kangaroo Rat	Dipodomys panamintinus panamintinus	No	No	T3	CA			4		No

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Dry	Mammals	Stephens's Kangaroo Rat	Dipodomys stephensi	Yes	Yes	G2	CA	CA		4	CA	No
Dry	Mammals	Spotted Bat	Euderma maculatum	No	Yes	G4	AZ, CA, NV, UT	CA, UT	PS	29	SW	No
Dry	Mammals	Greater Bonneted Bat	Eumops perotis	No	Yes	G5	CA			1	SW	No
Dry	Mammals	California Bonneted Bat	Eumops perotis californicus	No	Yes	T4	AZ	CA		7		No
Dry	Mammals	San Bernardino Flying Squirrel	Glaucomys sabrinus californicus	No	No	T2	CA			4		No
Dry	Mammals	Wolverine	Gulo gulo	No	Yes	G4	CA, UT			7	SW, CA	No
Dry	Mammals	Allen's Big-eared Bat	Idionycteris phyllotis	No	Yes	G3	NV, UT	AZ, UT	PS	8	SW	No
Dry	Mammals	Silver-haired Bat	Lasionycteris noctivagans	No	No	G5	CA			9	SW	No
Dry	Mammals	Western Red Bat	Lasiurus blossevillii	No	Yes	G5	AZ, CA, NV, UT	UT	PS	5	SW	Yes
Dry	Mammals	Hoary Bat	Lasiurus cinereus	No	No	G5	CA, NV		IL	13	SW	No
Dry	Mammals	Western Yellow Bat	Lasiurus xanthinus	No	Yes	G5	AZ, CA, NV		PS	13		No
Dry	Mammals	San Diego Black-tailed Jackrabbit	Lepus californicus bennettii	No	No	T3	CA			1		No
Dry	Mammals	Californian Leaf-nosed Bat	Macrotus californicus	No	Yes	G4	AZ, CA, NV	CA	PS	27	SW	No
Dry	Mammals	Sierra Marten	Martes americana sierrae	No	No	T3	CA			1		No
Dry	Mammals	Fisher	Martes pennanti	No	Yes	G5	CA	CA			SW, CA	No
Dry	Mammals	Fisher - West Coast Distinct Population Segment	Martes pennanti pop. 1	Yes	No	T2				2		No
Dry	Mammals	Desert Valley Kangaroo Mouse	Microdipodops megacephalus albiventer	No	Yes	T2	NV		MV	2		No
Dry	Mammals	Mohave Vole	Microtus californicus mohavensis	No	No	T1	CA			5		No
Dry	Mammals	Amargosa Vole	Microtus californicus scirpensis	Yes	Yes	T1	CA	CA		7		Yes
Dry	Mammals	Stephens' California Vole	Microtus californicus stephensi	No	No	T1	CA			1		No
Dry	Mammals	Owens Valley Vole	Microtus californicus vallicola	No	No	T1	CA	CA		9		No
Dry	Mammals	Long-tailed Vole	Microtus longicaudus	No	No	G5	AZ				SW, CA	No
Dry	Mammals	Montane Vole	Microtus montanus	No	No	G5	NV					No
Dry	Mammals	Pahranagat Valley Vole	Microtus montanus fucosus	No	Yes	T2	NV		PS	4		No
Dry	Mammals	Ash Meadows Montane Vole	Microtus montanus nevadensis	No	Yes	TH			PS	2		No
Dry	Mammals	Californian Myotis	Myotis californicus	No	No	G5	AZ			10	SW	No
Dry	Mammals	Western Small-footed Myotis	Myotis ciliolabrum	No	No	G5	CA, NV	AZ, CA	PS	24	SW	No
Dry	Mammals	Long-eared Myotis	Myotis evotis	No	No	G5	CA	AZ, CA	IL	17	SW	No
Dry	Mammals	Little Brown Myotis	Myotis lucifugus	No	No	G5	CA, NV	AZ	IL	3	SW	No
Dry	Mammals	Arizona Myotis	Myotis occultus	No	No	G3	CA			1		Yes
Dry	Mammals	Fringed Myotis	Myotis thysanodes	No	Yes	G4	CA, NV, UT	AZ, CA, UT	IL	32	SW	No
Dry	Mammals	Cave Myotis	Myotis velifer	No	No	G5	CA, NV	AZ, CA	PS	1	SW	No
Dry	Mammals	Long-legged Myotis	Myotis volans	No	No	G5	CA	AZ		31	SW	No
Dry	Mammals	Yuma Myotis	Myotis yumanensis	No	No	G5	CA, UT	CA		22	SW	No
Dry	Mammals	Least Chipmunk	Neotamias minimus	No	Yes	G5	AZ				SW, CA	No
Dry	Mammals	Palmer's Chipmunk	Neotamias palmeri	No	Yes	G2	NV		HV	11	SW	No

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Dry	Mammals	Kingston Mountain Chipmunk	Neotamias panamintinus acrus	No	No	T1	CA			5		No
Dry	Mammals	Lodgepole Chipmunk	Neotamias speciosus speciosus	No	No	T2	CA			13		No
Dry	Mammals	Uinta Chipmunk	Neotamias umbrinus	No	Yes	G5	AZ				SW, CA	No
Dry	Mammals	Hidden Forest Chipmunk	Neotamias umbrinus nevadensis	No	Yes	TH	NV		MV	1		No
Dry	Mammals	Colorado Valley Woodrat	Neotoma albigula venusta	No	No	T3	CA			1		No
Dry	Mammals	Bushy-tailed Woodrat	Neotoma cinerea	No	No	G5	AZ				SW, CA	No
Dry	Mammals	San Diego Desert Woodrat	Neotoma lepida intermedia	No	No	T3	CA			1		No
Dry	Mammals	Stephens's Woodrat	Neotoma stephensi	No	No	G5	UT				SW	No
Dry	Mammals	Crawford's Gray Shrew	Notiosorex crawfordi	No	No	G5	UT			3	SW, CA	No
Dry	Mammals	Pocketed Free-tailed Bat	Nyctinomops femorosaccus	No	No	G4	CA	AZ		10	SW	Yes
Dry	Mammals	Big Free-tailed Bat	Nyctinomops macrotis	No	Yes	G5	AZ, CA, NV, UT	AZ, UT	PS	10	SW	No
Dry	Mammals	American Pika	Ochotona princeps	No	Yes	G5	NV, UT		HV	1	SW, CA	No
Dry	Mammals	mule deer	Odocoileus hemionus	No	Yes	G5	NV, UT	CBR, MBR	PS		SW, CA	Yes
Dry	Mammals	Common Muskrat	Ondatra zibethicus	No	Yes	G5	AZ				SW, CA	No
Dry	Mammals	Southern Grasshopper Mouse	Onychomys torridus ramona	No	No	T3	CA			1		No
Dry	Mammals	Tulare Grasshopper Mouse	Onychomys torridus tularensis	No	No	T1	CA	CA		6		No
Dry	Mammals	Bighorn Sheep	Ovis canadensis	Yes	Yes	G4	AZ, UT					Yes
Dry	Mammals	Desert Bighorn Sheep	Ovis canadensis mexicana	No	No	T3	AZ				SW, CA, species level	No
Dry	Mammals	Desert Bighorn Sheep	Ovis canadensis nelsoni	No	Yes	T4	CA, NV	CA	PS	37		Yes
Dry	Mammals	Bighorn Sheep - Peninsular Ranges	Ovis canadensis pop. 2	Yes	Yes	T3				2		Yes
Dry	Mammals	Sierra Nevada Bighorn Sheep	Ovis canadensis sierrae	Yes	Yes	T1	CA, NV	CA		3		No
Dry	Mammals	Jaguar	Panthera onca	Yes	Yes	G3	AZ				SW	No
Dry	Mammals	Western Pipistrelle	Parastrellus hesperus	No	Yes	G5	AZ			27	SW	No
Dry	Mammals	White-eared Pocket Mouse	Perognathus alticolus	No	No	G1		CA			CA	No
Dry	Mammals	White-eared Pocket Mouse	Perognathus alticolus alticolus	No	No	TH	CA			2	CA	No
Dry	Mammals	Tehachapi Pocket Mouse	Perognathus alticolus inexpectatus	No	No	T1	CA			8		No
Dry	Mammals	Silky Pocket Mouse	Perognathus flavus	No	Yes	G5	UT	UT			SW	No
Dry	Mammals	San Joaquin Pocket Mouse	Perognathus inornatus	No	No	G4		CA			CA	No
Dry	Mammals	San Joaquin Pocket Mouse	Perognathus inornatus inornatus	No	No	T2	CA			3	CA	No
Dry	Mammals	Palm Springs Little Pocket Mouse	Perognathus longimembris bangsi	No	No	T2	CA	CA		9		No
Dry	Mammals	Los Angeles Pocket Mouse	Perognathus longimembris brevinasus	No	No	T1	CA			5		No
Dry	Mammals	Yellow-eared Pocket Mouse	Perognathus parvus xanthonotus	No	No	T2	CA	CA		6	CA	No
Dry	Mammals	Brush Deermouse	Peromyscus boylii	No	No	G5	NV					No
Dry	Mammals	Abert's Squirrel	Sciurus aberti	No	No	G5	UT				SW	No
Dry	Mammals	Merriam's Shrew	Sorex merriami leucogenys	No	No	T5	NV		PS	1		No
Dry	Mammals	water shrew	Sorex palustris	No	Yes	G5	AZ, NV		MV			No
Dry	Mammals	Inyo Shrew	Sorex tenellus	No	No	G3	NV		PS	5	SW, CA	No
Dry	Mammals	Mohave Ground Squirrel	Spermophilus mohavensis	No	Yes	G2	CA	CA		298	CA	No

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Dry	Mammals	Spotted Ground Squirrel	Spermophilus spilosoma	No	No	G5	AZ, UT				SW	No
Dry	Mammals	Palm Springs Round-tailed Ground Squirrel	Spermophilus tereticaudus chlorus	No	No	T2	CA	CA		7		No
Dry	Mammals	Brazilian Free-tailed Bat	Tadarida brasiliensis	No	Yes	G5	AZ			28	SW	No
Dry	Mammals	American Badger	Taxidea taxus	No	No	G5	CA			34	SW, CA	No
Dry	Mammals	Brown Bear	Ursus arctos	Yes	Yes	G4	UT			1	SW	No
Dry	Mammals	Kit Fox	Vulpes macrotis	Yes	Yes	G4	NV, UT	UT	PS	15	SW, CA	No
Dry	Mammals	Kit Fox - San Joaquin Valley Population	Vulpes macrotis mutica	Yes	Yes	T2	CA	CA			SW, CA, species level	No
Dry	Other Beetles	Aegialian Scarab Beetle	Aegialia knighti	No	No	G1				1		No
Dry	Other Beetles	Large Aegialian Scarab Beetle	Aegialia magnifica	No	No	G1				1		No
Dry	Other Beetles	Death Valley Agabus Diving Beetle	Agabus rumppi	No	No	G2				3		No
Dry	Other Beetles	Valley Elderberry Longhorn Beetle	Desmocerus californicus dimorphus	Yes	No	T2				3		No
Dry	Other Beetles	Casey's June Beetle	Dinacoma caseyi	Yes	No	G1				2		No
Dry	Other Beetles	Kelso Dune Glaresis Scarab Beetle	Glaresis arenata	No	No	G2				1		No
Dry	Other Beetles	Simple Hydroporus Diving Beetle	Hydroporus simplex	No	No	G1				1		No
Dry	Other Beetles	Furnace Creek Riffle Beetle	Microcylloepus formicoideus	No	No	G1				1		No
Dry	Other Beetles	Nelson's Miloderes Weevil	Miloderes nelsoni	No	No	G2				2		No
Dry	Other Beetles	Rulien's Miloderes Weevil	Miloderes sp. 1	No	No	G1				1		No
Dry	Other Beetles	Saline Valley Snow-front Scarab Beetle	Polyphylla anteronivea	No	No	G1				1		No
Dry	Other Beetles	Spotted Warner Valley Dunes Scarab Beetle	Polyphylla avittata	No	No	G2				2		No
Dry	Other Beetles	A Polyphyllan Scarab Beetle	Polyphylla erratica	No	No	G1				3		No
Dry	Other Beetles	Giuliani's Dune Scarab Beetle	Pseudocotalpa giulianii	No	No	G1				2		No
Dry	Other Beetles		Stenelmis lariversi	No	No	G1				1		No
Dry	Other Beetles	Moapa Warm Springs Riffle Beetle	Stenelmis moapa	No	No	G1				1		No
Dry	Other Beetles	Brown-tassel Trigonoscuta Weevil	Trigonoscuta brunnotesselata	No	No	G1				1		No
Dry	Other Insects	Ash Meadows Naucorid	Ambrysus amargosus	Yes	No	G1				2		No
Dry	Other Insects	Nevares Spring Naucorid Bug	Ambrysus funebris	Yes	No	G1				2		No
Dry	Other Insects	Saratoga Springs Belostoman Bug	Belostoma saratogae	No	No	G1				1		No
Dry	Other Insects	Lacewing or Ally	Oliarces clara	No	No	G2		AZ		2		No
Dry	Other Insects	Amargosa Naucorid Bug	Pelocoris shoshone	No	No	G2				4		No
Dry	Other Insects	A Naucorid Bug	Usingerina moapensis	No	No	G1				1		No
Dry	Reptiles	Silvery Legless Lizard	Anniella pulchra pulchra	No	No	T3	CA			9		No
Dry	Reptiles	Glossy Snake	Arizona elegans	No	No	G5	UT			17	SW, CA	No
Dry	Reptiles	Pai Striped Whiptail	Aspidoscelis pai	No	No	G3	AZ					No
Dry	Reptiles	Coastal Whiptail	Aspidoscelis tigris stejnegeri	No	No	T5	CA			1		No
Dry	Reptiles	Plateau Striped Whiptail	Aspidoscelis velox	No	No	G5	UT			6	SW	No
Dry	Reptiles	Zebra-tailed Lizard	Callisaurus draconoides	No	Yes	G5	UT	UT		71	SW, CA	No

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Dry	Reptiles	Southern Rubber Boa	Charina umbratica	No	Yes	G2	CA			27		No
Dry	Reptiles	Mojave Shovelnose Snake	Chionactis occipitalis occipitalis	No	No	T5	AZ				SW, CA, species level	No
Dry	Reptiles	Western Banded Gecko	Coleonyx variegatus	No	Yes	G5	NV, UT	UT		31	SW, CA	No
Dry	Reptiles	Utah Banded Gecko	Coleonyx variegatus utahensis	No	No	T4	AZ					No
Dry	Reptiles	Western Diamond-backed Rattlesnake	Crotalus atrox	No	No	G5	NV					No
Dry	Reptiles	Sidewinder	Crotalus cerastes	No	Yes	G5	UT	UT		20	SW, CA	No
Dry	Reptiles	Speckled Rattlesnake	Crotalus mitchellii	No	Yes	G5	UT	UT		6	SW, CA	No
Dry	Reptiles	Midget Faded Rattlesnake	Crotalus oreganus concolor	No	No	T4	AZ					No
Dry	Reptiles	Red Diamond Rattlesnake	Crotalus ruber ruber	No	No	T5	CA			13	CA	No
Dry	Reptiles	Mohave Rattlesnake	Crotalus scutulatus	No	Yes	G5	UT	UT		17	SW, CA	No
Dry	Reptiles	Great Basin Collared Lizard	Crotaphytus bicinctores	No	Yes	G5	NV					No
Dry	Reptiles	Ring-necked Snake	Diadophis punctatus	No	Yes	G5	UT			5	SW, CA	No
Dry	Reptiles	Desert Iguana	Dipsosaurus dorsalis	No	Yes	G5	NV, UT	UT	MV	2	SW, CA	No
Dry	Reptiles	Panamint Alligator Lizard	Elgaria panamintina	No	No	G2	CA	CA	PS	8	CA	No
Dry	Reptiles	Gilbert's Skink	Eumeces gilberti	No	No	G5	NV					No
Dry	Reptiles	Long-nosed Leopard Lizard	Gambelia wislizenii	No	No	G5	NV, UT		PS		SW, CA	No
Dry	Reptiles	Gila Monster	Heloderma suspectum	No	Yes	G4	UT	CA, UT		47	SW, CA	No
Dry	Reptiles	Banded Gila Monster	Heloderma suspectum cinctum	No	Yes	T4	CA, NV	AZ	MV	82		No
Dry	Reptiles	Nightsnake	Hypsiglena torquata	No	No	G5	UT				CA	No
Dry	Reptiles	Common Kingsnake	Lampropeltis getula	No	No	G5	UT			16	SW, CA	No
Dry	Reptiles	Sonoran Mountain Kingsnake	Lampropeltis pyromelana	No	Yes	G4	NV, UT		HV	7	SW	No
Dry	Reptiles	Utah Mountain Kingsnake	Lampropeltis pyromelana infralabialis	No	No	T3	AZ			1		Yes
Dry	Reptiles	California Mountain Kingsnake	Lampropeltis zonata	No	No	G4	CA	CA			CA	No
Dry	Reptiles	Western Threadsnake	Leptotyphlops humilis	No	Yes	G5	UT	UT		6	SW, CA	No
Dry	Reptiles	Rosy Boa	Lichanura trivirgata	No	No	G4	CA	AZ		6	SW, CA	No
Dry	Reptiles	Desert Rosy Boa	Lichanura trivirgata gracia	No	No	T3	AZ			9		Yes
Dry	Reptiles	Coachwhip	Masticophis flagellum	No	No	G5	UT			24	SW, CA	No
Dry	Reptiles	Coast Horned Lizard	Phrynosoma coronatum	No	No	G4	CA				CA	No
Dry	Reptiles	Flat-tailed Horned Lizard	Phrynosoma mcallii	Yes	Yes	G3	AZ, CA	CA		7	SW, CA	No
Dry	Reptiles	Desert Horned Lizard	Phrynosoma platyrhinos	No	No	G5	NV		PS		SW, CA	No
Dry	Reptiles	Spotted Leaf-nosed Snake	Phyllorhynchus decurtatus	No	No	G5	UT			1	SW, CA	No
Dry	Reptiles	Western Skink	Plestiodon skiltonianus	No	No	G5	UT				SW, CA	No
Dry	Reptiles	Coronado Skink	Plestiodon skiltonianus interparietalis	No	No	T5	CA	CA				No
Dry	Reptiles	Long-nosed Snake	Rhinocheilus lecontei	No	Yes	G5	UT			2	SW, CA	No
Dry	Reptiles	Western Patch-nosed Snake	Salvadora hexalepis	No	No	G5	UT			10	SW, CA	No
Dry	Reptiles	Common Chuckwalla	Sauromalus ater	No	Yes	G5	CA, NV, UT	UT		61	SW, CA	No
Dry	Reptiles	Western chuckwalla	Sauromalus obesus obesus	No	No	GNR		AZ (at species level)	FOR SPECIES			No

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Dry	Reptiles	Northern Sagebrush Lizard	Sceloporus graciosus graciosus	No	No	T5	CA	AZ, CA		1		No
Dry	Reptiles	Groundsnake	Sonora semiannulata	No	Yes	G5	UT			12	SW, CA	No
Dry	Reptiles	Smith's Black-headed Snake	Tantilla hobartsmithi	No	No	G5	AZ, UT			9	SW, CA	No
Dry	Reptiles	Two-striped Gartersnake	Thamnophis hammondii	No	No	G4	CA	CA		7		No
Dry	Reptiles	Western Lyresnake	Trimorphodon biscutatus	No	No	G5	UT				CA	No
Dry	Reptiles	Sonoran Lyresnake	Trimorphodon lambda	No	No	G5	NV		FOR SPECIES/SUB	5		No
Dry	Reptiles	Coachella Valley Fringe-toed Lizard	Uma inornata	Yes	Yes	G1	CA	CA		128	CA	No
Dry	Reptiles	Mojave Fringe-toed Lizard	Uma scoparia	No	Yes	G3	AZ, CA	CA		8	SW, CA	Yes
Dry	Reptiles	long-tailed brush lizard	Urosaurus graciosus	No	No	G5	NV		MV			No
Dry	Reptiles	Arizona Night Lizard	Xantusia arizonae	No	No	G1	AZ					No
Dry	Reptiles	Desert Night Lizard	Xantusia vigilis	No	Yes	G5	AZ, UT	UT	FOR SSP	12	SW, CA	No
Dry	Reptiles	desert night lizard	Xantusia vigilis vigilis	No	No	T5	NV		MV			No
Dry	Spiders & other Chelicerates	A Cave Obligate Schizomid	Hubbardia shoshonensis	No	No	G1						No
Dry	Spiders & other Chelicerates	A Cave Obligate Harvestman	Texella kokoweef	No	No	G1						No
Dry	Spiders & other Chelicerates	A Cave Obligate Harvestman	Texella shoshone	No	No	G1						No
Dry	Terrestrial Snails	Morongo Desertsnail	Eremarionta morongoana	No	No	G2				1		No
Dry	Terrestrial Snails	Victorville Shoulderband	Helminthoglypta mohaveana	No	No	G1				2		No
Dry	Terrestrial Snails	Santa Rita Ambersnail	Succinea grosvenori	No	No	G5		AZ				No
Dry	Terrestrial Snails	Rustic Ambersnail	Succinea rusticana	No	No	G2		AZ				No
Dry	Tiger Beetles	Mojave Giant Tiger Beetle	Amblycheila schwarzi	No	No	G3				2		No
Dry	Tiger Beetles	Maricopa Tiger Beetle	Cicindela oregona maricopa	No	No	T3		AZ		4		No
Dry	Tiger Beetles	Riparian Tiger Beetle	Cicindela praetextata	No	No	G2				1		No
Dry	Turtles	Desert Tortoise	Gopherus agassizii	Yes	Yes	G4	AZ, AZ, CA, NV, UT	CA	PS	1366	SW, CA	Yes
Dry	Turtles	Desert Tortoise - Mohave Population	Gopherus agassizii pop. 1	Yes	Yes	T3				85		Yes
Dry	Turtles	Desert Tortoise - Sonoran Population	Gopherus agassizii pop. 2	Yes	Yes	T4				57		Yes
Dry	Conifers & relatives	Death Valley Mormon-tea	Ephedra funerea	No	No	G2				3		No
Dry	Conifers & relatives	Bristlecone Pine	Pinus longaeva	No	Yes	G4				1		No
Dry	Ferns & relatives	Upward-lobed Moonwort	Botrychium ascendens	No	No	G2				4		No
Dry	Ferns & relatives	Crenulate Moonwort	Botrychium crenulatum	No	No	G3				9		No
Dry	Ferns & relatives	Utah Spike-moss	Selaginella utahensis	No	No	G2				7		No
Dry	Flowering Plants		Allium marvinii	No	No	G1				1		No
Dry	Flowering Plants	Spanish Needle Onion	Allium shevockii	No	No	G1		CA		9		No
Dry	Flowering Plants	Western Sand-parsley	Ammoselinum giganteum	No	No	G2				1		No
Dry	Flowering Plants	Rough Angelica	Angelica scabrida	No	No	G2		NV		25		No

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Dry	Flowering Plants	Charleston Pussytoes	Antennaria soliceps	No	No	G1				36		No
Dry	Flowering Plants	Unequal Rockcress	Arabis dispar	No	No	G3				18		No
Dry	Flowering Plants	Parish's Rockcress	Arabis parishii	No	No	G2				69		No
Dry	Flowering Plants	Darwin Rock Cress	Arabis pulchra var. munciensis	No	No	T4		CA		5		No
Dry	Flowering Plants	Shockley's Rockcress	Arabis shockleyi	No	No	G3				84		No
Dry	Flowering Plants	Las Vegas Bear-poppy	Arctomecon californica	No	Yes	G3		NV		383		No
Dry	Flowering Plants	Dwarf Bear-poppy	Arctomecon humilis	Yes	No	G1				338		No
Dry	Flowering Plants	White Bear-poppy	Arctomecon merriamii	No	No	G3				171		No
Dry	Flowering Plants	Meadow Valley Sandwort	Arenaria stenomeres	No	No	G2				10		No
Dry	Flowering Plants	Bear Valley Sandwort	Arenaria ursina	Yes	No	G2				50		No
Dry	Flowering Plants	California Silverbush	Argythamnia californica	No	No	G2				9		No
Dry	Flowering Plants	Ackerman's Milkvetch	Astragalus ackermanii	No	No	G2				9		No
Dry	Flowering Plants	Clokey's Milkvetch	Astragalus aequalis	No	No	G2		NV		38		No
Dry	Flowering Plants	Cushenbury Milkvetch	Astragalus albens	Yes	No	G1		CA		29		Yes
Dry	Flowering Plants		Astragalus ampullarioides	Yes	No	G1				6		No
Dry	Flowering Plants	Gumbo Milkvetch	Astragalus ampullarius	No	No	G2				1		No
Dry	Flowering Plants	Darwin Mesa Milkvetch	Astragalus atratus var. mensanus	No	No	T2		CA		7		No
Dry	Flowering Plants	Beatley's Milkvetch	Astragalus beatleyae	No	No	G2				23		No
Dry	Flowering Plants	Cima Milkvetch	Astragalus cimae var. cimae	No	No	T2		NV		16		No
Dry	Flowering Plants	Marble Canyon Milkvetch	Astragalus cremnophylax var. hevronii	No	No	T1		AZ				No
Dry	Flowering Plants	Cliff milkvetch	Astragalus cremnophylax var. myriorraphus	No	Yes	T1		AZ				No
Dry	Flowering Plants	Pagumpa Milkvetch	Astragalus ensiformis var. gracilior	No	No	T1		NV		1		No
Dry	Flowering Plants	Ertter's Milkvetch	Astragalus ertterae	No	No	G1		CA		4		No
Dry	Flowering Plants	Black Milkvetch	Astragalus funereus	No	No	G2		CA, NV		21		No
Dry	Flowering Plants	Sand Milkvetch	Astragalus geyeri var. triquetrus	No	Yes	T2		AZ, NV		50		No
Dry	Flowering Plants	Gilman's Milkvetch	Astragalus gilmanii	No	No	G2				12		No
Dry	Flowering Plants	Holmgren's Milkvetch	Astragalus holmgreniorum	Yes	Yes	G1				29		No
Dry	Flowering Plants	Horn's Milkvetch	Astragalus hornii var. hornii	No	No	T2		CA		2		No
Dry	Flowering Plants	Inyo Milkvetch	Astragalus inyoensis	No	No	G3				1		No
Dry	Flowering Plants	Lane Mountain Milkvetch	Astragalus jaegerianus	Yes	No	G1		CA		7		Yes
Dry	Flowering Plants	Coachella Valley Milkvetch	Astragalus lentiginosus var. coachellae	Yes	No	T2		CA		89		No
Dry	Flowering Plants	Sodaville Milkvetch	Astragalus lentiginosus var. sesquimetralis	No	Yes	T1		NV		1		No
Dry	Flowering Plants	Mottled Milkvetch	Astragalus lentiginosus var. stramineus	No	No	T2		NV		11		No
Dry	Flowering Plants	Big Bear Valley Woollypod	Astragalus leucolobus	No	No	G2				58		No
Dry	Flowering Plants	Half-ring Pod Milkvetch	Astragalus mohavensis var. hemigyrus	No	No	T2		NV		43		No
Dry	Flowering Plants	Mokiah Milkvetch	Astragalus mokiacensis	No	No	G2		NV		7		No
Dry	Flowering Plants	Aquarius milkvetch	Astragalus newberryi var. aquarii	No	No	T1		AZ				No
Dry	Flowering Plants	Nye Milkvetch	Astragalus nyensis	No	No	G3				27		No

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Dry	Flowering Plants	Charleston Milkvetch	Astragalus oophorus var. clokeyanus	No	No	T2		NV		25		No
Dry	Flowering Plants	Pink Egg Milkvetch	Astragalus oophorus var. lonchocalyx	No	No	T2		NV		1		No
Dry	Flowering Plants	Ash Meadows Milkvetch	Astragalus phoenix	Yes	Yes	G2		NV		13		No
Dry	Flowering Plants	Raven's Milkvetch	Astragalus ravenii	No	No	G1				2		No
Dry	Flowering Plants	Spring Mountain Milkvetch	Astragalus remotus	No	No	G2		NV		17		No
Dry	Flowering Plants	Silver Reef Milkvetch	Astragalus straturensis	No	No	G2				16		No
Dry	Flowering Plants	Diamond Butte milkvetch	Astragalus toanus var.scidulus	No	No	T2		AZ				No
Dry	Flowering Plants	Triple-rib Milkvetch	Astragalus tricarinatus	Yes	No	G1		CA		12		No
Dry	Flowering Plants		Atriplex argentea var. longitrichoma	No	No	T1		NV		3		No
Dry	Flowering Plants	Parish's Saltbush	Atriplex parishii	No	No	G1				1		No
Dry	Flowering Plants	Kofka Barberry	Berberis harrisoniana	No	No	G1		AZ, CA		1		No
Dry	Flowering Plants	Last Chance Rock Cress	Boechera yorkii	No	No	G1				2		No
Dry	Flowering Plants	Inyo County Mariposa-lily	Calochortus excavatus	No	No	G3		CA		31		No
Dry	Flowering Plants	Panamint Mountain Mariposa Lily	Calochortus panamintensis	No	No	G3				1		No
Dry	Flowering Plants	Plummer's Mariposa-lily	Calochortus plummerae	No	No	G3				2		No
Dry	Flowering Plants	Alkali Mariposa-lily	Calochortus striatus	No	No	G2		CA, NV		254		Yes
Dry	Flowering Plants	Peirson's Morning-glory	Calystegia peirsonii	No	No	G3				13		No
Dry	Flowering Plants	Baird's Camissonia	Camissonia bairdii	No	No	G1				3		No
Dry	Flowering Plants	Diamond Valley Suncup	Camissonia gouldii	No	No	G1				2		No
Dry	Flowering Plants	Kern River Evening-primrose	Camissonia integrifolia	No	No	G3		CA		3		No
Dry	Flowering Plants	White Canbya	Canbya candida	No	No	G3				29		No
Dry	Flowering Plants	Hays' Sedge	Carex haysii	No	No	G1				1		No
Dry	Flowering Plants	Crucifixion Thorn	Castela emoryi	No	Yes	G3				20		No
Dry	Flowering Plants	Ash Grey Indian-paintbrush	Castilleja cinerea	Yes	No	G2				85		No
Dry	Flowering Plants	Mt. Gleason Indian Paintbrush	Castilleja gleasoni	No	Yes	G2				4		No
Dry	Flowering Plants	San Bernardino Owl's-clover	Castilleja lasiorhyncha	No	No	G2				46		No
Dry	Flowering Plants	Payson's Caulanthus	Caulanthus simulans	No	No	G3				1		No
Dry	Flowering Plants	Jaeger's Caulostramina	Caulostramina jaegeri	No	No	G1		CA		6		No
Dry	Flowering Plants	Spring-loving Centaury	Centaurium namophilum	Yes	Yes	G2		NV		23		No
Dry	Flowering Plants	Flatseed Spurge	Chamaesyce platysperma	No	No	G3		CA		2		No
Dry	Flowering Plants	San Fernando Valley Chorizanthe	Chorizanthe parryi var. fernandina	Yes	Yes	T1				5		No
Dry	Flowering Plants	Parry's Spineflower	Chorizanthe parryi var. parryi	No	No	T2		CA		5		No
Dry	Flowering Plants	Pintwater Rabbitbrush	Chrysothamnus eremobius	No	No	G1				4		No
Dry	Flowering Plants	Clokey's Thistle	Cirsium clokeyi	No	No	G2				27		No
Dry	Flowering Plants	Virgin Thistle	Cirsium virginense	No	Yes	G2		NV		11		No
Dry	Flowering Plants	Pygmy Pussy-paws	Cistanthe pygmaea	No	No	G2				4		No
Dry	Flowering Plants	Temblor Range Clarkia	Clarkia tembloriensis ssp. calientensis	No	No	T1		CA		3		No
Dry	Flowering Plants	Tecopa Bird's-beak	Cordylanthus tecopensis	No	No	G2		CA, NV		12		No
Dry	Flowering Plants		Coryphantha chlorantha	No	No	G2				8		No
Dry	Flowering Plants	Clokey's Cat's-eye	Cryptantha clokeyi	No	No	G1		CA		5		No

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Dry	Flowering Plants	Unusual Cat's-eye	Cryptantha insolita	No	Yes	GH		NV		4		No
Dry	Flowering Plants	Bristle-cone Cryptantha	Cryptantha roosiorum	No	Yes	G1		CA		24		No
Dry	Flowering Plants	Pipe Springs Cryptantha	Cryptantha semiglabra	No	No	G1				1		No
Dry	Flowering Plants	Desert Cymopterus	Cymopterus deserticola	No	No	G3		CA		217		No
Dry	Flowering Plants	Sanicle Biscuitroot	Cymopterus ripleyi var. saniculoides	No	No	T3		CA		37		No
Dry	Flowering Plants	July Gold	Dedeckera eurekensis	No	Yes	G2		CA		21		No
Dry	Flowering Plants	Unexpected Larkspur	Delphinium inopinum	No	No	G3				8		No
Dry	Flowering Plants	Kern County Larkspur	Delphinium purpusii	No	No	G2		CA		2		No
Dry	Flowering Plants	Byron Larkspur	Delphinium recurvatum	No	No	G2		CA		1		No
Dry	Flowering Plants	Wasatch Draba	Draba brachystylis	No	No	G1				5		No
Dry	Flowering Plants	Jaeger Whitlowgrass	Draba jaegeri	No	No	G2				15		No
Dry	Flowering Plants	Charleston Draba	Draba paucifructa	No	No	G1				33		No
Dry	Flowering Plants	Mt. Whitney Draba	Draba sharsmithii	No	No	G1				4		No
Dry	Flowering Plants	Panamint Dudleya	Dudleya saxosa ssp. saxosa	No	No	T3		CA		10		No
Dry	Flowering Plants	Engelmann's Hedgehog Cactus	Echinocereus engelmannii var. armatus	No	Yes	T2				1		No
Dry	Flowering Plants	Howe's Hedgehog Cactus	Echinocereus engelmannii var. howei	No	No	T1		CA		3		No
Dry	Flowering Plants	Silver-leaf Sunray	Enceliopsis argophylla	No	No	G2		AZ		6		No
Dry	Flowering Plants	Panamint Daisy	Enceliopsis covillei	No	No	G3		CA		9		No
Dry	Flowering Plants	Ash Meadows Sunray	Enceliopsis nudicaulis var. corrugata	Yes	Yes	T2		NV		17		No
Dry	Flowering Plants	Nevada Willowherb	Epilobium nevadense	No	No	G2		NV		14		No
Dry	Flowering Plants	Hoover's Eriastrum	Eriastrum hooveri	No	No	G3		CA				No
Dry	Flowering Plants	Deer Goldenweed	Ericameria cervina	No	No	G3		NV		3		No
Dry	Flowering Plants	Charleston Mountain Heath-goldenrod	Ericameria compacta	No	No	G2				12		No
Dry	Flowering Plants	Pine Valley Goldenbush	Ericameria crispa	No	No	G2				2		No
Dry	Flowering Plants	Gilman Goldenweed	Ericameria gilmanii	No	No	G1		CA		5		No
Dry	Flowering Plants	Hall's Daisy	Erigeron aequifolius	No	No	G2		CA		1		No
Dry	Flowering Plants	Bald Daisy	Erigeron calvus	No	No	G1				1		No
Dry	Flowering Plants	Mound Daisy	Erigeron compactus	No	No	G2				1		No
Dry	Flowering Plants	Sheep Fleabane	Erigeron ovinus	No	No	G2		NV		14		No
Dry	Flowering Plants	Parish's Daisy	Erigeron parishii	Yes	No	G2		CA		52		No
Dry	Flowering Plants	Zion Daisy	Erigeron sionis	No	No	G2				10		No
Dry	Flowering Plants	Forked Buckwheat	Eriogonum bifurcatum	No	No	G2		CA, NV		317		No
Dry	Flowering Plants	Tehachapi Buckwheat	Eriogonum callistum	No	No	G1				1		No
Dry	Flowering Plants	Darin Buckwheat	Eriogonum concinnum	No	No	G2		NV		14		No
Dry	Flowering Plants	Reveal's Buckwheat	Eriogonum contiguum	No	No	G2		CA		16		No
Dry	Flowering Plants	Crispleaf Wild Buckwheat	Eriogonum corymbosum var. nilesii	Yes	No	T2		NV		177		No
Dry	Flowering Plants	Wildrose Canyon Buckwheat	Eriogonum eremicola	No	No	G1		CA		5		No
Dry	Flowering Plants	Thorne's Buckwheat	Eriogonum ericifolium var. thornei	No	Yes	T1				2		No
Dry	Flowering Plants	Gilman's Buckwheat	Eriogonum gilmanii	No	No	G2				10		No

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Dry	Flowering Plants	Heermann's Buckwheat	Eriogonum heermannii var. clokeyi	No	No	T2		NV		10		No
Dry	Flowering Plants	Hoffmann's Buckwheat	Eriogonum hoffmannii var. hoffmannii	No	No	T2		CA		6		No
Dry	Flowering Plants	Jointed Buckwheat	Eriogonum intrafractum	No	No	G2				14		No
Dry	Flowering Plants	Southern Mountain Buckwheat	Eriogonum kennedyi var. austromontanum	Yes	No	T2				102		No
Dry	Flowering Plants	Cache Peak Buckwheat	Eriogonum kennedyi var. pinicola	No	No	T1		CA		5		No
Dry	Flowering Plants	Panamint Mountains Buckwheat	Eriogonum microthecum var. panamintense	No	No	T2		CA		9		No
Dry	Flowering Plants	Cushenbury Buckwheat	Eriogonum ovalifolium var. vineum	Yes	No	T1		CA		95		Yes
Dry	Flowering Plants	Wire-stem Buckwheat	Eriogonum pharnaceoides var. cervinum	No	No	T2		NV		2		No
Dry	Flowering Plants	Sticky Buckwheat	Eriogonum viscidulum	No	Yes	G2		AZ, NV		39		No
Dry	Flowering Plants	Barstow Wooly-sunflower	Eriophyllum mohavense	No	No	G2		CA		78		Yes
Dry	Flowering Plants	Largeleaf Filaree	Erodium macrophyllum	No	No	G3				4		No
Dry	Flowering Plants	Twisselmann's Poppy	Eschscholzia minutiflora ssp. twisselmannii	No	No	T2		CA		71		No
Dry	Flowering Plants	Cushion Fox-tail Cactus	Escobaria alversonii	No	No	G3				69		No
Dry	Flowering Plants	Viviparous Foxtail Cactus	Escobaria vivipara var. rosea	No	Yes	T3				46		No
Dry	Flowering Plants	Catchfly Prairie-gentian	Eustoma exaltatum	No	No	G5		NV		2		No
Dry	Flowering Plants	California flannelbush	Fremontodendron californicum	No	Yes	G4		AZ				No
Dry	Flowering Plants	Onyx Bedstraw	Galium angustifolium ssp. onycense	No	No	T2		CA		8		No
Dry	Flowering Plants	San Gabriel Bedstraw	Galium grande	No	No	G2		CA		1		No
Dry	Flowering Plants	Kingston Bedstraw	Galium hilendiae ssp. kingstonense	No	No	T2		CA		8		No
Dry	Flowering Plants	Little San Bernardino Mountains gilia	Gilia maculata	No	No	G1				35		No
Dry	Flowering Plants	Nye Gilia	Gilia nyensis	No	No	G3				26		No
Dry	Flowering Plants	Ripley's Gilia	Gilia ripleyi	No	No	G3				57		No
Dry	Flowering Plants	Golden Carpet	Gilmania luteola	No	No	G1				13		No
Dry	Flowering Plants	Clokey's Greasebush	Glossopetalon clokeyi	No	No	G2				16		No
Dry	Flowering Plants	Pacific Greasebush	Glossopetalon pungens	No	No	G2		CA		1		No
Dry	Flowering Plants	Ash Meadows Gumweed	Grindelia fraxinopratensis	Yes	Yes	G2		NV		22		No
Dry	Flowering Plants	Sharsmith's Stickseed	Hackelia sharsmithii	No	No	G3				13		No
Dry	Flowering Plants	Utah Sunflower	Helianthus deserticola	No	No	G2				5		No
Dry	Flowering Plants	Red Rock tarplant	Hemizonia arida	No	Yes	G1				29		No
Dry	Flowering Plants	Mohave Tarplant	Hemizonia mohavensis	No	Yes	G2				15		No
Dry	Flowering Plants	Jones Golden-aster	Heterotheca jonesii	No	No	G2				7		No
Dry	Flowering Plants	Shaggy-hair Alumroot	Heuchera hirsutissima	No	No	G2				6		No
Dry	Flowering Plants	Parish's Alumroot	Heuchera parishii	No	No	G2				4		No
Dry	Flowering Plants	Rock Lady	Holmgrenanthe petrophila	No	Yes	G1				18		No
Dry	Flowering Plants	Sanderson's Cheesebush	Hymenoclea sandersonii	No	No	G1				1		No
Dry	Flowering Plants	California Satintail	Imperata brevifolia	No	No	G2		NV		7		No

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Dry	Flowering Plants	Spring Mountain Ankle-aster	Ionactis caelestis	No	No	G1		NV		3		No
Dry	Flowering Plants	Silver-haired Ivesia	Ivesia argyrocoma	No	No	G2				49		No
Dry	Flowering Plants	Rock Purpusia	Ivesia arizonica var. saxosa	No	No	T1		NV		1		No
Dry	Flowering Plants	Field Ivesia	Ivesia campestris	No	No	G3				1		No
Dry	Flowering Plants	Hidden Ivesia	Ivesia cryptocaulis	No	No	G2				13		No
Dry	Flowering Plants	Jaeger's Ivesia	Ivesia jaegeri	No	No	G2		CA, NV		46		No
Dry	Flowering Plants	Ash Meadows Mousetail	Ivesia kingii var. eremica	Yes	Yes	T1		NV		9		No
Dry	Flowering Plants	Kingston Mountains Ivesia	Ivesia patellifera	No	No	G1		CA		6		No
Dry	Flowering Plants	Coulter's Goldfields	Lasthenia glabrata ssp. coulteri	No	No	T3		CA		1		No
Dry	Flowering Plants	Bullfrog Hills Sweetpea	Lathyrus hitchcockianus	No	No	G2		NV		14		No
Dry	Flowering Plants	Pale-yellow Layia	Layia heterotricha	No	No	G2		CA		4		No
Dry	Flowering Plants	San Joaquin Woolly Threads	Lembertia congdonii	Yes	No	G3				2		No
Dry	Flowering Plants	Ross' Pitcher Sage	Lepechinia rossii	No	No	G1				2		No
Dry	Flowering Plants	San Jacinto Prickly Phlox	Leptodactylon jaegeri	No	No	G2				6		No
Dry	Flowering Plants	Hitchcock's Bladderpod	Lesquerella hitchcockii	No	No	G3						No
Dry	Flowering Plants	San Bernardino Mountains Bladderpod	Lesquerella kingii ssp. bernardina	Yes	No	T1				6		Yes
Dry	Flowering Plants	Yosemite Lewisia	Lewisia disepala	No	No	G2				4		No
Dry	Flowering Plants	Lemon Lily	Lilium parryi	No	Yes	G3				33		No
Dry	Flowering Plants	San Gabriel Linanthus	Linanthus concinnus	No	No	G2				8		No
Dry	Flowering Plants	Baldwin Lake Linanthus	Linanthus killipii	No	No	G2				26		No
Dry	Flowering Plants	Orcutt's Linanthus	Linanthus orcuttii	No	No	G4		CA		2		No
Dry	Flowering Plants	Sage-like Loeflingia	Loeflingia squarrosa ssp. artemisiarum	No	No	T2		NV		14		No
Dry	Flowering Plants	Owen's Peak lomatium	Lomatium shevockii	No	No	G1		CA		4		No
Dry	Flowering Plants	Wright's Hosackia	Lotus argyraeus var. multicaulis	No	No	T1		CA, NV		6		No
Dry	Flowering Plants	Holmgren Lupine	Lupinus holmgrenianus	No	No	G2		NV		6		No
Dry	Flowering Plants	Panamint Mountains Lupine	Lupinus magnificus var. magnificus	No	No	T1		CA		11		No
Dry	Flowering Plants	Father Crowley's Lupine	Lupinus padre-crowleyi	No	Yes	G2				3		No
Dry	Flowering Plants	Peirson's Lupine	Lupinus peirsonii	No	No	G2				6		No
Dry	Flowering Plants	Davidson's Bushmallow	Malacothamnus davidsonii	No	No	G1				2		No
Dry	Flowering Plants	Inyo balzingstar	Mentzelia inyoensis	No	No	G2		CA		5		No
Dry	Flowering Plants	Ash Meadows Blazingstar	Mentzelia leucophylla	Yes	Yes	G1		NV		8		No
Dry	Flowering Plants	September 11 stickleaf	Mentzelia memorabalis	No	No	G1		AZ				No
Dry	Flowering Plants	Polished Blazingstar	Mentzelia polita	No	No	G2		CA, NV		2		No
Dry	Flowering Plants	Three-tooth Blazingstar	Mentzelia tridentata	No	No	G2		CA		9		No
Dry	Flowering Plants	San Bernardino Mountain Monkeyflower	Mimulus exiguus	No	No	G2				24		No
Dry	Flowering Plants	Mojave Monkeyflower	Mimulus mohavensis	No	No	G2		CA		53		Yes
Dry	Flowering Plants	Calico Monkeyflower	Mimulus pictus	No	No	G2		CA		3		No
Dry	Flowering Plants	Little Purple Monkeyflower	Mimulus purpureus	No	No	G2				29		No

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Dry	Flowering Plants	Kelso Creek Monkeyflower	Mimulus shevockii	No	No	G2		CA		18		No
Dry	Flowering Plants	Bashful Four-o'clock	Mirabilis pudica	No	No	G3				2		No
Dry	Flowering Plants	sweet-smelling monardella	Monardella beneolens	No	No	G1		CA		6		No
Dry	Flowering Plants	Robison's Monardella	Monardella robisonii	No	No	G2		CA		56		No
Dry	Flowering Plants	California Muhly	Muhlenbergia californica	No	No	G3				2		No
Dry	Flowering Plants	Piute Mountains Navarretia	Navarretia setiloba	No	No	G1		CA		1		No
Dry	Flowering Plants	Amargosa Niterwort	Nitrophila mohavensis	Yes	Yes	G1		CA, NV		6		No
Dry	Flowering Plants	Eureka Dunes Evening-primrose	Oenothera californica ssp. eurekensis	Yes	Yes	T1				3		No
Dry	Flowering Plants	Cave Evening-primrose	Oenothera cavernae	No	No	G2				4		No
Dry	Flowering Plants	Golden Prickly-pear	Opuntia aurea	No	Yes	G3				3		No
Dry	Flowering Plants	Short Joint Beavertail	Opuntia basilaris var. brachyclada	No	No	T3		CA		47		No
Dry	Flowering Plants	Bakersfield Beavertail Cactus	Opuntia basilaris var. treleasei	Yes	Yes	T2		CA		27		No
Dry	Flowering Plants	Sand Cholla	Opuntia pulchella	No	Yes	G4		NV		1		No
Dry	Flowering Plants	Blue Diamond Cholla	Opuntia whipplei var. multigeniculata	No	Yes	T2		NV		10		No
Dry	Flowering Plants	Woolly Mountain-parsley	Oreonana vestita	No	No	G3				12		No
Dry	Flowering Plants	Nevada Oryctes	Oryctes nevadensis	No	No	G2		NV		18		No
Dry	Flowering Plants	Cushenbury Oxytheca	Oxytheca parishii var. goodmaniana	Yes	No	T1				24		Yes
Dry	Flowering Plants	San Bernardino Butterweed	Packera bernardina	No	No	G2				30		No
Dry	Flowering Plants	Fringed Grass-of-Parnassus	Parnassia cirrata	No	No	G2				1		No
Dry	Flowering Plants	Kaibab pincushion cactus	Pediocactus paradinei	No	Yes	G2		AZ				No
Dry	Flowering Plants	Siler Pincushion Cactus	Pediocactus sileri	Yes	Yes	G3				5		No
Dry	Flowering Plants	Beaver Scurf-pea	Pediomelum castoreum	No	No	G3				16		No
Dry	Flowering Plants	White-margin Beardtongue	Penstemon albomarginatus	No	Yes	G2		AZ, CA, NV		28		No
Dry	Flowering Plants	Dune Beardtongue	Penstemon arenarius	No	No	G2		NV		1		No
Dry	Flowering Plants	Pinto beardtongue	Penstemon bicolor	No	No	G3		AZ				No
Dry	Flowering Plants	Bicolored Beardtongue	Penstemon bicolor ssp. bicolor	No	No	T2		NV		39		No
Dry	Flowering Plants	Rosy Bicolored Beardtongue	Penstemon bicolor ssp. roseus	No	Yes	T3		CA, NV		55		No
Dry	Flowering Plants	Limestone Beardtongue	Penstemon calcareus	No	No	G2				21		No
Dry	Flowering Plants	Mt Trumbull beardtongue	Penstemon distans	No	Yes	G2		AZ				No
Dry	Flowering Plants	Death Valley Beardtongue	Penstemon fruticiformis ssp. amargosae	No	No	T3		NV		38		No
Dry	Flowering Plants	Pahute Mesa Beardtongue	Penstemon pahutensis	No	No	G3		NV		28		No
Dry	Flowering Plants	Petiolate Beardtongue	Penstemon petiolatus	No	No	G2		AZ		13		No
Dry	Flowering Plants	Stephen's Beardtongue	Penstemon stephensii	No	No	G2		CA		14		No
Dry	Flowering Plants	Jaeger's Beardtongue	Penstemon thompsoniae ssp. jaegeri	No	No	T2		NV		27		No
Dry	Flowering Plants	Inyo Rock Daisy	Perityle inyoensis	No	No	G2		CA		7		No
Dry	Flowering Plants	Hanaupah rock daisy	Perityle villosa	No	No	G1		CA		7		No
Dry	Flowering Plants	Parry Sandpaper-plant	Petalonyx parryi	No	No	G2						No
Dry	Flowering Plants	Death Valley Sandpaper-plant	Petalonyx thurberi ssp. gilmanii	No	No	T2		CA		20		No

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Dry	Flowering Plants	marble rockmat	Petrophyton acuminatum	No	No	G1				1		No
Dry	Flowering Plants	Aven Nelson's Phacelia	Phacelia anelsonii	No	No	G2				15		No
Dry	Flowering Plants	Beatley's Phacelia	Phacelia beatleyae	No	No	G3				25		No
Dry	Flowering Plants		Phacelia filiae	No	No	G2		NV		24		No
Dry	Flowering Plants	Geranium-leaf Scorpionweed	Phacelia geraniifolia	No	No	G2				1		No
Dry	Flowering Plants	Inyo Phacelia	Phacelia inyoensis	No	No	G3		CA		5		No
Dry	Flowering Plants	Nodding-flower Scorpionweed	Phacelia laxiflora	No	No	G2				4		No
Dry	Flowering Plants	Mono County Phacelia	Phacelia monoensis	No	No	G3		CA		1		No
Dry	Flowering Plants	Death Valley Roundleaf Phacelia	Phacelia mustelina	No	No	G2		CA, NV		25		No
Dry	Flowering Plants	Nash's Phacelia	Phacelia nashiana	No	No	G3		CA		109		No
Dry	Flowering Plants	Nine Mile Canyon Phacelia	Phacelia novenmillensis	No	No	G2		CA		14		No
Dry	Flowering Plants	Parish's Phacelia	Phacelia parishii	No	No	G2		AZ, CA, NV		12		Yes
Dry	Flowering Plants	Bear Valley Phlox	Phlox dolichantha	No	No	G2				37		No
Dry	Flowering Plants	Scaly sand food	Pholisma arenaria	No	Yes	G3		AZ				No
Dry	Flowering Plants	Parish's Popcorn-flower	Plagiobothrys parishii	No	No	G1				6		No
Dry	Flowering Plants	Desert Allocarya	Plagiobothrys salsus	No	No	G2				2		No
Dry	Flowering Plants	San Bernardino Bluegrass	Poa atropurpurea	Yes	No	G2				21		No
Dry	Flowering Plants	Spiny Milkwort	Polygala heterorhyncha	No	No	G3				7		No
Dry	Flowering Plants	Pygmy Poreleaf	Porophyllum pygmaeum	No	No	G2				13		No
Dry	Flowering Plants		Prunus eremophila	No	No	G1				49		No
Dry	Flowering Plants	Parish's Alkali Grass	Puccinellia parishii	No	Yes	G2		CA		1		No
Dry	Flowering Plants	Muir's Raillardiopsis	Raillardiopsis muirii	No	No	G2				1		No
Dry	Flowering Plants	Grand Canyon rose	Rosa stellata ssp. abyssa	No	Yes	T2		AZ				No
Dry	Flowering Plants		Saltugilia latimeri	No	No	G2		CA		15		No
Dry	Flowering Plants	Death Valley Sage	Salvia funerea	No	No	G3		NV		4		No
Dry	Flowering Plants	Orocopia Sage	Salvia greatae	No	No	G2		CA		2		No
Dry	Flowering Plants	Mohave Fishhook Cactus	Sclerocactus polyancistrus	No	Yes	G4				14		No
Dry	Flowering Plants	Paria Plateau fishhook cactus	Sclerocactus sileri	No	Yes	G1		AZ				No
Dry	Flowering Plants	Davidson's Stonecrop	Sedum niveum	No	No	G3						No
Dry	Flowering Plants	Owens Valley Checker-mallow	Sidalcea covillei	No	Yes	G3		CA		23		No
Dry	Flowering Plants	Pedate Checker-mallow	Sidalcea pedata	Yes	Yes	G1				41		No
Dry	Flowering Plants	Clokey's Catchfly	Silene clokeyi	No	No	G2				7		No
Dry	Flowering Plants	Funeral Mountain Blue-eyed-grass	Sisyrinchium funereum	No	No	G2				14		No
Dry	Flowering Plants	Big-root Blue-eyed-grass	Sisyrinchium radicatum	No	No	G2		NV		5		No
Dry	Flowering Plants		Sphaeralcea gierischii	Yes	No	G1				3		No
Dry	Flowering Plants	Charleston Tansy	Sphaeromeria compacta	No	No	G2				34		No
Dry	Flowering Plants	Zion Tansy	Sphaeromeria ruthiae	No	No	G2				1		No
Dry	Flowering Plants	Ash Meadows Ladies'-tresses	Spiranthes infernalis	No	No	G1				15		No
Dry	Flowering Plants	California Jewelflower	Stanfordia californica	Yes	Yes	G1				1		No

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Dry	Flowering Plants	Laguna Mountains Streptanthus	Streptanthus bernardinus	No	No	G3				11		No
Dry	Flowering Plants	Southern Jewelflower	Streptanthus campestris	No	No	G2				3		No
Dry	Flowering Plants	Piute Mountains Jewelflower	Streptanthus cordatus var. piutensis	No	No	T1		CA		2		No
Dry	Flowering Plants	Alpine Jewelflower	Streptanthus gracilis	No	No	G3				3		No
Dry	Flowering Plants	Eureka Dunes Grass	Swallenia alexandrae	Yes	Yes	G1				5		No
Dry	Flowering Plants	San Bernardino Aster	Symphyotrichum defoliatum	No	No	G3		CA		6		No
Dry	Flowering Plants	Greata's Aster	Symphyotrichum greatae	No	No	G2				6		No
Dry	Flowering Plants	Welsh's American-aster	Symphyotrichum welshii	No	No	G2				3		No
Dry	Flowering Plants	Charleston Kittentails	Synthyris ranunculina	No	No	G2				43		No
Dry	Flowering Plants	California Dandelion	Taraxacum californicum	Yes	No	G2				43		No
Dry	Flowering Plants	Holly-leaf Tetracoccus	Tetracoccus ilicifolius	No	No	G1				7		No
Dry	Flowering Plants	Slender-petal Thelypody	Thelypodium stenopetalum	Yes	Yes	G1				14		No
Dry	Flowering Plants	Aravaipa woodfern	Thelypteris puberula var. sonorensis	No	No	T3		AZ				No
Dry	Flowering Plants	Black Rock Ground-daisy	Townsendia smithii	No	No	G1		AZ				No
Dry	Flowering Plants	Three hearts	Tricardia watsonii	No	No	G4		AZ				No
Dry	Flowering Plants	Dedecker's Clover	Trifolium dedeckerae	No	No	G2		CA		10		No
Dry	Flowering Plants	Clausen's Violet	Viola clauseniana	No	No	G1				2		No
Dry	Flowering Plants	Mecca Aster	Xylorhiza cognata	No	No	G2		CA		9		No
Dry	Mosses		Didymodon nevadensis	No	No	G2		NV		12		No
Dry	Mosses		Entosthodon planoconvexus	No	No	G1				1		No
Dry	Mosses		Grimmia americana	No	No	G1				1		No
Dry	Mosses		Orthotrichum shevockii	No	No	G1		CA, NV		3		No
Dry	Mosses		Orthotrichum spjutii	No	No	G1				2		No
Dry	Mosses		Pohlia tundrae	No	No	G2				1		No
Dry	Mosses		Trichostomum sweetii	No	No	G2				2		No
Wet	Amphibians	Southern Mountain Yellow-legged Frog	Rana muscosa	Yes	No	G2	CA			21	SW, CA	No
Wet	Amphibians	Northern Leopard Frog	Rana pipiens	No	Yes	G5	AZ, CA, NV, UT	UT	PS	15	SW, CA	No
Wet	Amphibians	Yavapai Leopard Frog	Rana yavapaiensis	No	Yes	G4	AZ, CA	CA		4	SW	Yes
Wet	Amphibians	Western Spadefoot	Spea hammondii	No	No	G3	CA			5	CA	No
Wet	Amphibians	Great Basin Spadefoot	Spea intermontana	No	No	G5	AZ	CA		1	SW, CA	Yes
Wet	Birds	Clark's Grebe	Aechmophorus clarkii	No	Yes	G5	AZ, NV					No
Wet	Birds	Western Grebe	Aechmophorus occidentalis	No	Yes	G5	AZ, NV					No
Wet	Birds	Wood Duck	Aix sponsa	No	Yes	G5	AZ				SW	No
Wet	Birds	American Wigeon	Anas americana	No	Yes	G5	AZ				SW	No
Wet	Birds	Northern Shoveler	Anas clypeata	No	Yes	G5	AZ				SW	No
Wet	Birds	Cinnamon Teal	Anas cyanoptera	No	Yes	G5	NV					No
Wet	Birds	Great Blue Heron	Ardea herodias	No	Yes	G5	CA				SW	No
Wet	Birds	Lesser Scaup	Aythya affinis	No	Yes	G5					SW	No

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Wet	Birds	American Bittern	Botaurus lentiginosus	No	Yes	G4	AZ, CA					No
Wet	Birds	Canada Goose	Branta canadensis	No	Yes	G5	AZ				SW	No
Wet	Birds	Barrow's Goldeneye	Bucephala islandica	No	Yes	G5	CA				SW	No
Wet	Birds	Green Heron	Butorides virescens	No	Yes	G5				2	SW	No
Wet	Birds	Least Sandpiper	Calidris minutilla	No	Yes	G5	NV					No
Wet	Birds	American Dipper	Cinclus mexicanus	No	Yes	G5	AZ				SW, CA	No
Wet	Birds	Fulvous Whistling-Duck	Dendrocygna bicolor	No	Yes	G5	CA					No
Wet	Birds	Wilson's Snipe	Gallinago delicata	No	Yes	G5	AZ					No
Wet	Birds	Least Bittern	Ixobrychus exilis	No	Yes	G5	CA			4	SW	No
Wet	Birds	Western Least Bittern	Ixobrychus exilis hesperis	No	Yes	T3	NV		PS	1		No
Wet	Birds	Long-billed Dowitcher	Limnodromus scolopaceus	No	Yes	G5	NV					No
Wet	Birds	Wood Stork	Mycteria americana	No	Yes	G4	CA			1		No
Wet	Birds	American White Pelican	Pelecanus erythrorhynchos	No	Yes	G4	CA, NV, UT		MV	9	SW	No
Wet	Birds	Double-crested Cormorant	Phalacrocorax auritus	No	Yes	G5	CA				SW	No
Wet	Birds	red-necked phalarope	Phalaropus lobatus	No	Yes	G4	NV		MV			No
Wet	Birds	White-faced Ibis	Plegadis chihi	No	Yes	G5	CA, NV		PS	2	SW	No
Wet	Birds	Yuma Clapper Rail	Rallus longirostris yumanensis	Yes	Yes	T3	AZ, CA, NV	CA	PS	19		No
Wet	Birds	American Avocet	Recurvirostra americana	No	Yes	G5	AZ, NV, UT		PS	6	SW	No
Wet	Birds	Least Tern	Sternula antillarum	Yes	Yes	G4				2	SW	No
Wet	Caddisflies	Denning's Cryptic Caddisfly	Cryptochia denningi	No	No	G1				1		No
Wet	Freshwater & Anadromous Fishes	Desert Sucker	Catostomus clarkii	No	Yes	G3		AZ, UT		223		No
Wet	Freshwater & Anadromous Fishes	White River Desert Sucker	Catostomus clarkii intermedius	No	Yes	T1			HV	1		No
Wet	Freshwater & Anadromous Fishes	Meadow Valley Wash Desert Sucker	Catostomus clarkii ssp. 2	No	Yes	T2				6		No
Wet	Freshwater & Anadromous Fishes	Bluehead Sucker	Catostomus discobolus	No	Yes	G4		UT		3		No
Wet	Freshwater & Anadromous Fishes	Flannelmouth Sucker	Catostomus latipinnis	No	Yes	G3		AZ, UT	PS	103		No
Wet	Freshwater & Anadromous Fishes	Santa Ana Sucker	Catostomus santaanae	Yes	No	G1				2		No
Wet	Freshwater & Anadromous Fishes	White River Springfish	Crenichthys baileyi baileyi	Yes	Yes	T1			PS	2		Yes
Wet	Freshwater & Anadromous Fishes	Hiko White River Springfish	Crenichthys baileyi grandis	Yes	Yes	T1			PS			Yes
Wet	Freshwater & Anadromous Fishes	Moapa White River Springfish	Crenichthys baileyi moapae	No	Yes	T2			PS	7		No
Wet	Freshwater & Anadromous Fishes	Devil's Hole Pupfish	Cyprinodon diabolis	Yes	Yes	G1			PS	4		No
Wet	Freshwater & Anadromous Fishes	Desert Pupfish	Cyprinodon macularius	Yes	Yes	G1		CA		3		No
Wet	Freshwater &	Amargosa Pupfish	Cyprinodon nevadensis amargosae	No	No	T1		CA		3		No

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	Anadromous Fishes											
Wet	Freshwater & Anadromous Fishes	Ash Meadows Pupfish	Cyprinodon nevadensis mionectes	Yes	Yes	T2			PS	17		No
Wet	Freshwater & Anadromous Fishes	Warm Springs Amargosa Pupfish	Cyprinodon nevadensis pectoralis	Yes	Yes	T1			PS	7		No
Wet	Freshwater & Anadromous Fishes	Owens River Pupfish	Cyprinodon radiosus	Yes	Yes	G1		CA		6		No
Wet	Freshwater & Anadromous Fishes	Cottonball Marsh Pupfish	Cyprinodon salinus milleri	No	Yes	T1				1		No
Wet	Freshwater & Anadromous Fishes	Pahrump poolfish	Empetrichthys latos	Yes	Yes	G1			MV			No
Wet	Freshwater & Anadromous Fishes	Pahrump Poolfish	Empetrichthys latos latos	Yes	Yes	T1			MV	4		No
Wet	Freshwater & Anadromous Fishes	Unarmored Threespine Stickleback	Gasterosteus aculeatus williamsoni	Yes	Yes	T1		CA		3		No
Wet	Freshwater & Anadromous Fishes	Mohave Tui Chub	Gila bicolor mohavensis	Yes	Yes	T1		CA		7		No
Wet	Freshwater & Anadromous Fishes	Owens Tui Chub	Gila bicolor snyderi	Yes	Yes	T1		CA		3		Yes
Wet	Freshwater & Anadromous Fishes	Bonytail	Gila elegans	Yes	Yes	G1			PS	4		No
Wet	Freshwater & Anadromous Fishes	Arroyo Chub	Gila orcuttii	No	No	G2				3		No
Wet	Freshwater & Anadromous Fishes	Roundtail Chub	Gila robusta	Yes	Yes	G3		UT		21		No
Wet	Freshwater & Anadromous Fishes	A Roundtail Chub	Gila robusta jordani	Yes	Yes	T1			PS	2		No
Wet	Freshwater & Anadromous Fishes	Virgin River Chub	Gila seminuda	Yes	Yes	G1			PS	44		Yes
Wet	Freshwater & Anadromous Fishes	Virgin River Chub - Muddy River Population	Gila seminuda pop. 2	Yes	Yes	T1				9		No
Wet	Freshwater & Anadromous Fishes	Virgin Spinedace	Lepidomeda mollispinis	Yes	Yes	G1				148		No
Wet	Freshwater & Anadromous Fishes	Virgin River Spinedace	Lepidomeda mollispinis mollispinis	No	Yes	T1		UT	PS	4		No
Wet	Freshwater & Anadromous Fishes	Moapa Dace	Moapa coriacea	Yes	Yes	G1			PS	6		No
Wet	Freshwater & Anadromous Fishes	Bonneville Cutthroat Trout	Oncorhynchus clarkii utah	No	Yes	T4		UT		5		No
Wet	Freshwater & Anadromous Fishes	Woundfin	Plagopterus argentissimus	Yes	Yes	G1			PS	41		Yes
Wet	Freshwater & Anadromous Fishes	Colorado Pikeminnow	Ptychocheilus lucius	Yes	Yes	G1		CA		1		No
Wet	Freshwater & Anadromous Fishes	Speckled Dace	Rhinichthys osculus	Yes	No	G5		AZ		154		No
Wet	Freshwater & Anadromous Fishes	Moapa Speckled Dace	Rhinichthys osculus moapae	No	Yes	T1			PS	4		No

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Wet	Freshwater & Anadromous Fishes	Ash Meadows Speckled Dace	Rhinichthys osculus nevadensis	Yes	Yes	T1			PS	10		No
Wet	Freshwater & Anadromous Fishes	Amargosa Canyon Speckled Dace	Rhinichthys osculus ssp. 1	No	No	T1		CA		3		No
Wet	Freshwater & Anadromous Fishes	Owens Speckled Dace	Rhinichthys osculus ssp. 2	No	No	T1		CA		2		No
Wet	Freshwater & Anadromous Fishes	White River Speckled Dace	Rhinichthys osculus ssp. 7	No	No	T2			MV			No
Wet	Freshwater & Anadromous Fishes	Pahranagat Speckled Dace	Rhinichthys osculus velifer	No	Yes	T1			PS	4		No
Wet	Freshwater & Anadromous Fishes	A Speckled Dace	Rhinichthys sp. 3	No	No	G1				3		No
Wet	Freshwater & Anadromous Fishes	Razorback Sucker	Xyrauchen texanus	Yes	Yes	G1		CA	IL	14		No
Wet	Freshwater Snails	Badwater Snail	Assiminea infima	No	No	G1			PS	5		No
Wet	Freshwater Snails	Robust Tryonia	Ipnobius robustus	No	No	G1				3		No
Wet	Freshwater Snails	Moapa Pebblesnail	Pyrgulopsis avernalis	No	No	G1		AZ	PS	7		No
Wet	Freshwater Snails	Grand Wash Springsnail	Pyrgulopsis bacchus	No	No	G1		AZ				No
Wet	Freshwater Snails	A Freshwater Snail	Pyrgulopsis carinifera	No	No	G1		AZ	PS	5		No
Wet	Freshwater Snails	Blue Point Pyrg	Pyrgulopsis coloradensis	No	No	GH		AZ		1		No
Wet	Freshwater Snails	Kingman Springsnail	Pyrgulopsis conica	No	No	G1		AZ				No
Wet	Freshwater Snails	Crystal Springsnail	Pyrgulopsis crystalis	No	No	G1		AZ	PS	1		No
Wet	Freshwater Snails	Spring Mountains Pyrg	Pyrgulopsis deaconi	No	No	G1		AZ	HV	5		No
Wet	Freshwater Snails	Desert Springsnail	Pyrgulopsis deserta	No	Yes	G2		AZ		4		No
Wet	Freshwater Snails	Ash Meadows Pebblesnail	Pyrgulopsis erythropoma	No	No	G1		AZ	PS	5		No
Wet	Freshwater Snails	Fairbanks Springsnail	Pyrgulopsis fairbanksensis	No	No	G1		AZ	PS	1		No
Wet	Freshwater Snails	Corn Creek Pyrg	Pyrgulopsis fausta	No	No	G1		AZ	MV	2		No
Wet	Freshwater Snails	Hubbs Pyrg	Pyrgulopsis hubbsi	No	No	G1		AZ	PS			No
Wet	Freshwater Snails	Elongate-gland Springsnail	Pyrgulopsis isolata	No	No	G1		AZ	PS	1		No
Wet	Freshwater Snails	Toquerville Springsnail	Pyrgulopsis kolobensis	No	No	G5		AZ		3		No
Wet	Freshwater Snails	Pahranagat Pebblesnail	Pyrgulopsis merriami	No	No	G1		AZ	PS	1		No
Wet	Freshwater Snails	Oasis Valley Springsnail	Pyrgulopsis micrococcus	No	No	G3		AZ	MV	18		No
Wet	Freshwater Snails	Distal-gland Springsnail	Pyrgulopsis nanus	No	No	G1		AZ	PS	4		No
Wet	Freshwater Snails	Median-gland Springsnail	Pyrgulopsis pisteri	No	No	G1		AZ	PS	3		No
Wet	Freshwater Snails	Southeast Nevada Pyrg	Pyrgulopsis turbatrix	No	No	G2		AZ	HV	11		No
Wet	Freshwater Snails	Wong's Springsnail	Pyrgulopsis wongi	No	No	G2		AZ	MV	24		No
Wet	Freshwater Snails	Sportinggoods Tryonia	Tryonia angulata	No	No	G1			PS	3		No
Wet	Freshwater Snails	Grated Tryonia	Tryonia clathrata	No	No	G2			PS	9		No
Wet	Freshwater Snails	Point of Rocks Tryonia	Tryonia elata	No	No	G1			PS	2		No
Wet	Freshwater Snails	Minute Tryonia	Tryonia ericae	No	No	G1			PS	2		No
Wet	Freshwater Snails	Grapevine Springs Elongate Tryonia	Tryonia margae	No	No	G1				2		No

Ecoregion Model Group	Taxonomic Group	Common_Name	Scientific Name	Federally Listed	State Protected	Rounded Global Rank	Relevant SWAPs	Relevant BLM Special Status	NatureServe Climate Vulnerability Index	# of Natural Heritage Locations	Available GAP Habitat Models	Other Spatial Data
Wet	Freshwater Snails	Grapevine Springs Squat Tryonia	Tryonia rowlandsi	No	No	G1				1		No
Wet	Freshwater Snails	Cottonball Marsh Tryonia	Tryonia salina	No	No	G1						No
Wet	Freshwater Snails	Amargosa Tryonia	Tryonia variegata	No	No	G2			PS	16		No
Wet	Mammals	American Beaver	Castor canadensis	No	Yes	G5	AZ				SW, CA	No
Wet	Mammals	Southwestern River Otter	Lontra canadensis sonora	No	Yes	T1	AZ, CA			3		Yes
Wet	Reptiles	Southern Pacific Pond Turtle	Actinemys marmorata pallida	No	No	T2	CA					No
Wet	Turtles	Western Pond Turtle	Actinemys marmorata	No	No	G3	CA	CA		15	SW, CA	No
Wet	Turtles	Sonoran Mud Turtle	Kinosternon sonoriense	No	No	G4	CA				SW	No

Appendix IV. Management Questions: Implications from Data Evaluation

Following are management questions forwarded from Task 1. In the last column we identify the relevant data sources and indicate any need for change or possible removal due to inadequate data.

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
Species				
What is the current distribution of occupied habitat for each CE, including seasonal habitat, and movement corridors?	Each CE			**Terrestrial Coarse Filter CEs**: Central Mojave Veg Map plus NatureServe map (ReGAP and LANDFIRE EVT); with addt'l refinement. **Aquatic Coarse Filter CEs**: NatureServe map plus NHD Plus, and NWI. Fine-filter CEs: Natural Heritage, FWS, SWAP, and Misc. sources data. D**ata for Movement Corridors not yet identified.**
Where are current CE populations potentially affected by change agents (and potentially at risk)?	Each CE crossed with CAs	All CAs		Criteria for evaluating ecological integrity exist in some form for most Coarse Filter CEs. These finer-grain conceptual models enable us t state assumptions about effects of Change agents. It wil be feasible to complete review and refinement of these criteria for subsequent application to spatial modeling.
What is the current distribution of suitable habitat for each CE?	Each CE			The same data sets from the first two questions apply to answer these questions.
Where are change agents potentially affecting this habitat and/or movement corridors?	Each CE crossed with CAs	All CAs		We do NOT yet have all corridor-related data identified.
Where are CEs whose habitats are systematically threatened by CAs (other than climate change)?	Subset of CEs with restricted habitats	All CAs	During Task 3, select CE subset	The same data sets from the first two questions apply to answer these questions.
What areas have been surveyed and what areas have not been surveyed (i.e., data gap locations)?	Each CE			This is a Task 3 activity once species CEs are finalized.
Given current and anticipated future locations of change agents, which habitat areas remain as opportunities for habitat enhancement/restoration?	Subset of CEs		During Task 3, select CE subset or specific habitats.	In addition to the same data sets referenced in the first two questions, SSURGO and LANDFIRE BpS data sets will be useful for this application.
Where are potential areas to restore connectivity?	Selected subset of habitats and locations.		Determine which CEs have connectivity as a relevant concern. Select subset of habitats or locations.	This will be explored and documented as methodology in Task 3. We will answer remaining data input questions at that point.
Where will CEs experience climate outside their current climate envelope?	Each CE	Climate Change	Standard climate envelope analysis	We are reasonably well postitioned to address this for major CEs using climate effects models that build on PRISM (4km data) and downscaled future projects (15 km data). Confidence in outputs will vary depending on natural characteristics of CEs and spatial resolution of climate data.
Native Plant Communities				
Where are intact CE vegetative communities located?	All CEs that are vegetative communities			Terrestrial Coarse Filter CEs: Central Mojave Vegetation plus NatureServe map (ReGAP and LANDFIRE EVT); with merge and addt'l refinement.

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
Where are the locations that most likely include the highest-integrity examples of each major terrestrial ecological system type?	All CEs that are vegetative communities		Develop metric for Integrity that can be applied to CE communities with available data.	Criteria for evaluating ecological integrityprovide conceptual model detail. Spatial information to be derived from various landscape condition models and LANDFIRE spattial outputs (raw and refined).
Where will these current communities be potentially affected by Change Agents?	All CEs that are vegetative communities crossed with CAs	All CAs		Data referenced above for current location of all CEs.
Where will current locations of these communities experience significant and abrupt deviations from normal climate variation?	All CEs that are vegetative communities	Climate Change	TBD: Climate models to use and the definition of "significant". This could evolve into a standard climate envelope analysis.	Georeference sample data (from ReGAP & LANDFIRE LFRDB) represent current distributions of types and dominant species for climate envelope models with PRISM data. These then for source material for analysis of future climate envelopes using USGS 15 km data.
Terrestrial Sites of High Biodiversity				
Where are High Biodiversity sites?	Ecoregion-wide		During Task 3, develop a specific working definition of "high biodiversity". For example, is it just species richness, R? Or richness of CEs?	These have been defined as priority sites identfied through previous planning efforts. These can be covered adequately with SWAP locations (not yet acquired) TNC ecoregional portoflio sites, and other selected sources.
Where will these High Biodiversity sites be potentially affected by Change Agents?	All High Biodiversity sites (working definition required) crossed with CAs	All CAs		same as above, in combination with CA data.
Where will current locations of these High Biodiversity sites experience significant and abrupt deviations from normal climate variation?	All High Biodiversity sites (working definition required)	Climate Change, potentially other CAs	TBD: Climate models to use and the definition of "significant". This could evolve into a standard climate envelope analysis.	Same as above, with climate effects model outputs (and inherent limitations based on spatial resolution and uncertainty stemming from climate data).
Aquatic Sites of High Biodiversity				
Where are Aquatic High Biodiversity sites?	All Aquatic High Biodiversity sites (working definition required)		During Task 3, develop a specific working definition of "high biodiversity". For example, is it just species richness, R? Or richness of CEs?	These have been defined as priority sites identfied through previous planning efforts. These can be covered adequately with SWAP locations (not yet acquired) TNC ecoregional portoflio sites, and other selected sources.
Where will these Aquatic High Biodiversity sites be potentially affected by Change Agents?	All Aquatic High Biodiversity sites (working	All CAs		Same as above, in combination with CA data

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
	definition required) crossed with CAs			
Where will current locations of these Aquatic High Biodiversity sites experience significant and abrupt deviations from normal climate variation?	All Aquatic High Biodiversity sites (working definition required)	Climate Change	TBD: Climate models to use and the definition of "significant". This could evolve into a standard climate envelope analysis.	Same as above, with climate effects model outputs (and inherent limitations based on spatial resolution and uncertainty stemming from climate data).
Specially Designated Areas of Ecological Value				
Where are specially designated areas of ecological value?	Ecoregion-wide		Define subset from the list of CEs or other designated locations.	The 2010 Protected Areas Database provides a foundation for this. Additional selected data sets can fill this out.
Grazing, Wild Horses and Burros				
Where are the current Herds of Wild Horses?	Wild horses		Will be represented as HAs and HMAs as in the data sources indicated to the right.	These are shown in the BLM herd and herd management area maps
Where are the current Herds of Burros?	Burros		As above.	Same as above
Where are the current Herd Management Areas (HMAs)?	Wild horses, Burros			Same as above
Which HMAs are exceeding AML?	Wild horses, Burros	Grazing	Can not be answered with the information available.	Additional data on herd numbers and range conditions are required to answer this MQ
Which current HMA will experience significant effects of Change Agents?	HMAs, Grazing	All CAs		This will be addressed further as change agent datasets are identified and compared against HMAs.
Which current Allotments will experience significant effects of Change Agents?	Allotments, Grazing	All CAs		This will be addressed further as change agent datasets are identified and compared against allotment areas
Which Allotments and HMA will experience climate outside their current climate envelope?	HMAs, Allotments, Grazing	Climate Change, Grazing	Standard climate envelope analysis	This will be addressed further as climate change data is developed and compared against those target areas
Soils				
Where are target and sensitive soil types within the ecoregion?	Ecoregion-wide		Develop list of relevant soil types. MQ modified to include sensitive soil types. Possible additional analyses: What is the relationship between sensitive soils and areas of high biodiversity significance? Are areas of endemism related to unique soils, for example which are related to unique pollinators, etc? There are groups in Clark County that are trying to get at this.	SSURGO, with gap-filling using STATSGO, surficial geology and 10m DEM-derived landforms. A BLM key for identifying sensitive soil types have been obtained.

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
Where will these target soil types be potentially affected by Change Agents?	All target soil types (working definition required) crossed with CAs	All CAs		Same as above, in combination with CA data.
Where will current locations of these High Biodiversity sites experience significant and abrupt deviations from normal climate variation?	All target soil types (working definition required)		TBD: Climate models to use and the definition of "significant". This could evolve into a standard climate envelope analysis.	All agreed-upon locational data for these PLs, plus climate data from PRISM (4km) and projections (15km)
Surface and Subsurface Water Availability				
Where are current water resources, both natural and man-made?	All surface water bodies		Note: coordinate with a related question in Groundwater Extraction.	NHD, NHDPlus, NID (the latter to help identify artificial impoundments)
Of these water resources, which are perennial, ephemeral, etc?	All surface water bodies			NHD, NHDPlus
Of these water resources, what is their surface water/groundwater connectivity?	All surface water bodies		In CA, ground water and surface water are treated very differently from a legal perspective. From a scientific standpoint they are obviously connected. Where is surface development going to affect groundwater, which may affect surface water (See SNWA)? These issues are not directly meaureable (see right) at regional scales. Proposed revision to the MQ is as follows: "Among these surface water resources, which streams have baseflows that indicate a significant contribution of groundwater to stream hydrology, and what basin fill aquifers may be the source(s) of this contribution; and what aquifers may be the sources for base water levels in springs or seeps?"	Not directly measurable at regional scale; surrogate for streams will be: (a) USGS-SWPA data to identify basin fill aquifers surrounding water bodies; (b) USGS baseflow index data, either organized by grid (bfi48grd) or for NHDPlus (nhd_bfi) or extracted from the standard streamflow statistics included in NHD, to assess the relative contribution of groundwater discharge to coarse-filter aquatic CE stream hydrology. For springs/seeps, we will use the source identified in spring/seep site assessment data if available.
What is the natural range of variation in high and low water levels or flows (e.g., frequency, timing, duration of high and low water levels or flows)?	All surface water bodies		Proposed revision to the MQ is as follows: "What is the natural variation of monthly discharge and monthly baseflow for streams and rivers?"	Not directly measurable at regional scale; surrogate will be: (a) monthly catchment runoff estimates from USGS Flint & Flint (2007) data; or (b) catchment runoff estimate from the NHDPlus attribute layer for overland flow (nhd_ieof); and/or (c) baseflow estimation from the NHDPlus attribute layer for USGS Baseflow Index (nhd_bfi) or gridded bfi values (USGS bfi48grd) or streamflow statistics from NHD depending on which we find most easily manipulable
Where are the aquifers and their recharge areas?	All relevant areas			USGS SWPA and Flint & Flint 2007
Where will these water resources be potentially affected by Change Agents?	All surface water bodies crossed with CAs	Many CAs	Will address the "where" not the "how" component of this MQ	(see discussion of CAs)
Aquatic Ecological Function and				

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
Structure				
What is the condition of target aquatic systems? OR What is the condition of target aquatic systems in terms of PFC?	All surface water bodies (may require a subset)	Hydrologic alternation, Invasive species, Development	Many may not have "PFC" defined, especially if they are not riparian. Need to look beyond "function and structure" to look at factors that may contribute to resistance and resilience in the face of disturbances and change agents. This requires a conceptual model: What are the ecological and environmental factors that contribute the most to ecological structure and function, including resistance and resilience in the face of disturbances and change agents? To be developed further during Task 3.	• Biotic condition: aquatic bioassessment data from federal and state monitoring programs (federal data include EMAP-WSA and other data from Utah State University Western Monitoring Center and Utah State University-BLM National Monitoring Center [aka BLM "Buglab"]. State data come from individual state aquatic bioassessment programs); and data on native aquatic species distributions (from Heritage pgms) and aquatic non-native (nuisance) species distributions (see Invasives CA discussion) • Abiotic condition: data on the proportion of annual stream flow resulting from groundwater discharge (baseflow) via USGS bfi datasets (see above); the spatial extent of perennial versus intermittent flow via NHDPlus (see above); the intensity of monthly runoff across associated watershed catchment via Flint & Flint (2007) data and via NHDPlus (nhd_ieof); water quality via USEPA database on USEPA State Impaired Waters data (linked to NHD); the distribution of dams (Army Corps NID); and habitat quality (from Utah State University Western Monitoring Center data and BLM "Buglab" data). • Landscape context: data on snowpack, runoff and recharge dynamics from the USGS (Flint & Flint 2007 data), near-stream and watershed land cover and land use (same as source of Landscape Condition data for terrestrial CEs), water use in the surrounding surface watershed and contributing groundwater zone (from USGS SWPA and state publications), atmospheric deposition of N (a representative potential acidification agent as well as a nutrient) and Hg (a representative potential bioaccumulative pollutant) (from NADP data. To support the analysis of landscape context, we have also identified sources of data with which to identify the basin fill aquifers potentially responsible for sustaining base flow or base water elevations in aquatic CEs, and the watershed zones within each HUC potentially most responsible for generating surface runoff to streams and recharge to basin fill aquifers (USGS SWPA; Flint & Flint 2007 data).
Where are the degraded aquatic systems (e.g., water quality)?	All surface water bodies	Hydrologic alteration, Invasive species, Development	Requires a working definition of degraded. TBD in a conceptual model.	See notes above on biotic, abiotic condition; landscape context for hydrologic and water quality degradation; see Invasives for the latter.
Fire History				
What areas have experienced significant fire?	Ecoregion-wide	Wildfire (increased and/or decreased frequency)	Requires a working definition of "significant fire" effects. To be addressed in the modeling in Task 3.	GeoMac, Fire Perimeters, Fire Occurrence, and Burn Severity data sets
In places that have experienced fire, where does the resulting vegetative structure and composition differ from the desired state?	Among locations that have experience significant fire	Wildfire (increased and/or decreased frequency)	Requires, for each location, a definition of what constitutes "desired state". TBD in Task 3.	LANDFIRE FRCC and subsequent spatial model outputs.

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
Fire Potential				
Where are current areas with high potential for fire?	Ecoregion-wide	Wildfire (increased and/or decreased frequency)		LANDFIRE FRCC and subsequent spatial model outputs; National Lightening Detection Network.
Where are areas that in the future will have high potential for fire?	Ecoregion-wide	Wildfire (increased and/or decreased frequency)	Devise a working definition of "potential for fire". TBD in Task 3. Based on climate changes and potential changes in vegetation. Coordinate with other relevant MQs.	LANDFIRE FRCC and subsequent spatial model outputs, in combination with Climate Change effects models; severely lmited by spatial resolution and uncertainty inherent with use of future climate projections.
Invasive Species				
What is the current distribution of invasive species included as CAs?	Ecoregion-wide	All invasive species CAs	Note: there is often a large time lag between 'real- time',current distributions and reported locations in databases; particularly for remote, seldom visited water bodies	A very diverse selection of datasets are available, most of which are highly localized or state-level. Will likely require modeling for many species. Aquatics: USGS Nonindigenous Aquatic Species Program, supplemental datasets, supplemental datasets from Montana State University, USGS Ft Collins, Desert Research Institute
What areas are significantly ecologically affected by invasive species?	Ecoregion-wide	All invasive species CAs	Requires a working definition of "significantly ecologically affected". Especially the word, "significantly", which is usually reserved for statistical evaluation. Various definitions of 'ecologically affected' are possible (e.g., loss of biodiversity, reduced number of native species of concern, dominance, alterations of ecological function, (e.g. trophic level impacts, primary and secondary production, trophic cascades, etc.), in some cases mere presence. AMT should discuss possible definitions. Although ecologists justifiably assume that invasive aquatic species have "ecological effects", very few scientific studies or assessments have been made on the 'ecological affects" (what ever definition we use) of invasive aquatic species in MBR; particularly in remote, isolated aquatic habitats.	Conservation element databases and the resulting models, invasive species locations and resulting models
Where are areas (significantly affected by invasives) that have restoration potential?	Areas identified as significantly affected by invasives.	All invasive species CAs	Requires working definition of "restoration potential. There should be specific definitions for each invasive species under consideration. Also, areas and methods for restoration consideration should be selected based, in part, on whether restoration methods are evaluated as being less harmful than the presence of the invasive species. There are several real life examples where restoration attempts have caused more ecological damage than the invasive species	Data and model development will reveal areas where restoration is possible however guidence and further development of "restoration potential" is required to target and refine this MQ.
Given current patterns of occurrence and expansion, what is the potential future distribution of invasive species included as CAs?	Ecoregion-wide	All invasive species CAs	Based on climate changes and recent patterns of occurrence and expansion. Future distribution is primarily dependent on an invasive species' biological and environmental niche (including niches that become more favorable due to climate changes);	Data and model development will suggest where future distribution will take place.

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
			dispersal ability (including human related dispersal i.e. mostly recreational activities); and present and future suitability of habitat (including available food resources, competition with natives, parasites, and predator interactions). Is this as far as we want or can take this? Can address this as relative degrees of susceptibility.	
Where are areas of nitrogen deposition?	Ecoregion-wide		See MQ Section"Atmospheric Deposition" at the end of this appendix.	
Development				
Where are current locations of relevant development types?	Ecoregion-wide	Development, Transportation and Energy Infrastructure		Spatially explicit datasets of different development types are available for most development CAs. Raster datasets of LU/LC may needed to fill in data gaps.
Where are areas of planned or potential development (outside of current urban areas) (e.g., under lease, plans of operation, governmental planning), including transmission corridors?	Ecoregion-wide	Development, Transportation and Energy Infrastructure	Based on available planning documents.	Some planned development areas are thoroughly documented and available (proposed energy transmission corridors, planned pipelines, etc). Off-the-shelf models (SURGoM, ICLUS) can be customized for ecoregion.
Where are the areas of significant ecological change from these anthropogenic activities?	Ecoregion-wide	Development, Transportation and Energy Infrastructure	Based on areas thought to be the targets of development. Develop a working definition of "potential development" that incorporates proximity to existing urban areas, roads, or power lines. Develop a working definition of "significant ecological changed". TBD in Task 3.	Need to clarify several terms, this will likely be answered later in the process. Focus on identifying ecological areas most vulnerable to change and their relative contribution to overall system(s).
Where do locations of current CEs overlap with areas of potential change from anthropogenic activities?	All CEs	Development, Transportation and Energy Infrastructure	Coordinate with Species and other CE-related MQs. This MQ may obviate the MQ "Where are the areas of significant ecological change from these anthropogenic activities?"	Urban growth models can be intersected with CEs to identify locations where resource and development conflicts are likely to occur.
Where are ecological areas with significant recreational use?	Ecoregion-wide	Recreation (land-based, water-based)		See text on Theobald's Natural Landscape's model. Additional data is pending from the BLM on designated ORV use areas.
Oil, Gas, and Mining Development				
Where are the current locations of Oil, Gas, and Mining (including gypsum) development?	Ecoregion-wide	Extractive energy development	Based on available data and planning documents.	BLM oil, gas and solid mining lease areas, USGS Mineral Resource Data System, additional data (yet to be identified) from federal and state authorities.

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
Where are areas under plans of operation?	Ecoregion-wide	Extractive energy development	Based on available data and planning documents.	Current locations of oil and gas drilling are forethcoming from the NOC. Active mine and quarry areas will need to be obtained from state or federal authorities.
Where are areas under lease?	Ecoregion-wide	Extractive energy development	Based on available data and planning documents.	BLM oil, gas and mining lease areas
Where are areas with mineral deposits, free use permits, or community pits?	Ecoregion-wide	Extractive energy development	Based on available data and planning documents.	Solid mineral lease areas, free-use areas and community pit data may not be digital, spatially explicit or accumulated at a regional level.
Where are the areas of potential future locations of Oil, Gas, and Mining (including gypsum) development (locatable, salable, and fluid and solid leasable minerals?	Ecoregion-wide	Extractive energy development	Based on available planning documents and known distributions of resources.	EPCA3, mineral lease areas, MBR has a very diverse range of mineral deposits, may be difficult to identify these areas, will request all locations of all established mining and quarrying claims locations
Where do locations of current CEs and other relevant resources overlap with areas of potential future locations of energy development?	All CEs, relevant other resources (including water resources)	Extractive energy development	Coordinate with Species and other CE-related MQs.	all relevant CE locational data, relevant energy development maps
Renewable Energy Development				
Where are the current locations of renewable energy development (solar, wind, geothermal, transmission, and any other upcoming renewable technologies)?	Ecoregion-wide	Renewable energy development	Based on available data and planning documents.	Solar Energy Study Areas, apart from geothermal facilities, existing solar and wind sites have not been identified yet but should be easy to obtain
Where are the areas of potential and physically possible locations for renewable energy development?	Ecoregion-wide	Renewable energy development	Based on planning documents. Also potentially requires definitions of minimum physical conditions for certain development types (e.g., wind maps, etc). Coordinate with Groundwater Extraction MQs.	NREL solar and wind potential areas, Great Basin Geothermal potential and exploration data
Where are the areas suitable for off-site mitigation and conservation efforts?	Among current and potential development sites.	Renewable energy development	Requires a working definition of suitable mitigation. Should be developed during Task 3, and specific to CEs and locations.	Not identified yet; will be able to address this as data is modeled and analyzed
Where do locations of current CEs and other relevant resources overlap with areas of potential future locations of renewable energy development?	All CEs, relevant other resources (including water)	Renewable energy development	Coordinate with Species and other CE-related MQs.	all relevant CE locational data, relevant energy development maps
Groundwater Extraction and Transportation				

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
Where are aquifers and their recharge zones?	Ecoregion-wide		Coordinate with Surface and Subsurface Water Availability MQs	USGS SWPA, Flint & Flint 2007 and nhd_recharge data; backup datasets include USGS Great Basin 1:1,000,000 aquifer study and USGS-Nevada joint aquifer study (2006)
Where will change agents be more powerful if groundwater is extracted?	Ecoregion-wide	All CAs		(see discussion of CAs)
Where are areas with groundwater resources available to sustain renewable energy projects that would not degrade aquatic ecosystems that also depend on these groundwater resources.	Ecoregion-wide	Hydrologic Alteration, Renewable Energy Development	Coordinate with Renewable Energy MQs. Will not be able to directly answer this and needs to be reframed. Some spotty data exists but only for Sonoran. We have revised the original version of this MQ for consistency with the kinds of data available. Proposed revision to the MQ is as follows: ""Where are the principal aquifers that potentially support perennial water levels or flows in aquatic ecosystem CE occurrences?"	The original version of this MQ was too fine-detailed a question to be answered with an REA, because the groundwater zones contributing to any individual surface aquatic feature may be quite localized or identifiable only via detailed hydrogeologic field investigations. We will pursue a coarser, surrogate approach in which we overlay aquatic CE locations with aquifer locations (from USGS SWPA), filtered for aquatic CE occurrences with perennial water (from NHDPlus, including via nhd_bfi) to identify principal aquifers that potentially support perennial water levels/flows in these CE occurrences.
Where are the areas showing effects from existing groundwater extraction?	Ecoregion-wide	Hydrologic Alteration	Requires a working definition of "effects".	NWIS for water level declines, but more importantly USGS SWPA, and state water atlas publications for water level dclines and ground collapses
Where are artificial water bodies including evaporation ponds, etc.?	Ecoregion-wide		Note: Coordinate with an MQ in Surface Water.	Not sure how we would distinguish "artificial" except as impoundments behind dams (US Army Corps NID)
Where are the areas with groundwater basins in an overdraft condition?	Ecoregion-wide	Hydrologic Alteration	This is not a question about areas where existing groundwater extraction is having ecological effects (already addressed elsewhere) but a question of where groundwater extraction exceeds the long-term potential for recharge.	This is essentially the same question as the one about "areas showing effects from existing groundwater extraction" with the same answer as above.
Surface Water Consumption and Diversion				
Where are the areas of potential future change in surface water consumption and diversion?	Ecoregion-wide	Hydrologic alteration, Climate change, Development	This should show up in any analysis of where "development" growth is most likely; and in the mapping of where water-intensive energy development is most likely.	This will be an output of the analysis of development/urbanization CA
Where are the areas with surface water resources available to sustain solar power, and other forms of development without degrading aquatic ecosystems that also depend on these groundwater resources?	Ecoregion-wide	Renewable energy development	Coordinate with Renewable Energy MQs. This is an extension of the mapping of where surface waters exist that support aquatic CEs, combined with the mapping of development potential and existing proposals for water resource development. Determining where surface water resources are "available" for development in any given localityrequires locality-specific, spatially and hydro-geologically detailed data on water rights and water resources, the acquisition and analysis of which lie outside the scope of this REA. However, since this is the arid west, it can safely be assumed that every surface water body in	We will assemble information on existing plans for surface water resource development, to identify localities where the planned areas of water diversion and use overlap with occurrences of aquatic CEs and their supporting surface water catchments and, if identifiable, the groundwater basins that support baseflows or base water elevations for these CE occurrences.

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
			the ecoregion is fully appropriated for water rights under state and federal law. In fact, some may be over-appropriated, i.e., some junior rights can be exercised only during wet years when all more senior rights are fully served. For this reason, it can safely be assumed that no surface waters are available for such development without transfer or private lease from an existing rights holder. Proposed revision to the MQ is as follows: "Where are the areas with surface water resources available to sustain solar power, and other forms of development without degrading aquatic ecosystems that also depend on these surface water resources?"	
Where are the areas showing ecological effects from existing surface water exploitation?	Relevant CEs	Hydrologic alteration, Development	Generate this information by coupling map information on density of surface water use (diversions as well as consumption) from state and USGS reports, with information on degree of degradation of aquatic ecological integrity.	We have to rely on comparisons of historic published records (rather than GIS data) on the distribution of perennial flows and perennial water levels in springs, to records of their distribution today; we have not identified GIS data layers for this purpose.
Where are artificial water bodies including evaporation ponds, etc.?	Ecoregion-wide		Coordinate with an MQ in Surface Water.	We will see what we can get from NHD, but this may simply be too fine-detailed a question for a REA.
Where are the areas with existing surface water extraction that has caused natural aquatic communities to become entirely dry, either seasonally or perennially?	Relevant CEs	Hydrologic alteration, Development	Generate this information by coupling map information on existence of formerly perennial streams with where they don't exists anymore, and overlay information on intensity of upstream and adjacent surface water extraction.	This is essentially the same question as the one about "areas showing effects from existing surface water exploitation" with the same answer as above.
Climate Change: Terrestrial Resource Issues				
Where will changes in climate be greatest relative to normal climate variability?	Ecoregion-wide	Climate Change	Climate change will affect every location, but affect different locations in different ways. So the issue is not where any effects will occur, but where these effects will potentially cause significant ecological change affecting priority conservation elements. Exact climate models are TBD.	Current climate envelopes for CEs based on 4 km PRISM data and change measured through 15 km downscaled data. Climate Change effects models are severely lmited by spatial resolution and uncertainty inherent with use of future climate projections.

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
Given anticipated climate shifts and the direction shifts in distributions, where are areas of potential habitat fragmentation?	Ecoregion-wide	Climate Change	Fragmentation may be difficult to assess. Consider species-specific responses/perceptions of fragmentation.	Current CA data, project CA data, and Projected CE distribution models. Confidence decreases rapidly with future projections as bth sptail resolution gets coarser and confidence in predicted patterns decreases approaching 2060. Climate Change effects models are severely lmited by spatial resolution and uncertainty inherent with use of future climate projections.
Which native plant communities will experience climate completely outside their normal range?	CEs that are plant communities.	Climate Change	Climate envelope studies are complicated by the likelihood that assemblages will not move intact, but shift and reform based on the movements of individual species. This MQ needs further refinement during Task 3 and the analysis. Coordinate with MQ in "Native Plant Communities".	Current climate envelopes for CEs based on 4 km PRISM data and change measured through 15 km downscaled data. Climate Change effects models are severely lmited by spatial resolution and uncertainty inherent with use of future climate projections.
Where will wildlife habitat experience climate completely outside its normal range?	Select relevant wildlife species	Climate Change	Requires a working definition of "wildlife habitat". Coordinate with the "plant communities and climate change MQ".	Current climate envelopes for CEs based on 4 km PRISM data and change measured through 15 km downscaled data. Climate Change effects models are severely lmited by spatial resolution and uncertainty inherent with use of future climate projections.
Where are wildlife species ranges (on the element list) that will experience significant and abrupt deviations from normal climate variation?	Select relevant wildlife species	Climate Change	Consider further reframe as standard climate envelope analysis.	Current climate envelopes for CEs based on 4 km PRISM data and change measured through 15 km downscaled data. Climate Change effects models are severely lmited by spatial resolution and uncertainty inherent with use of future climate projections.
Based on recent distributions and expansion patterns of insect pests and disease, what are expected distributions in the future?	Select relevant pest species	Climate Change, Invasive species	This is a research questions that possibly requires speculation beyond the scope of the REA. This MQ remains provisional, and be dropped and listed as a gap in research.	Current climate envelopes for CAs based on 4 km PRISM data and change measured through 15 km downscaled data. Climate Change effects models are severely lmited by spatial resolution and uncertainty inherent with use of future climate projections.
Climate Change: Aquatic Resource Issues				

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
Where are aquatic resources that will experience significant and abrupt deviations from normal climate variation?	Ecoregion-wide	Climate Change, Hydrologic alteration	Climate change will affect every location, but affect different locations in different ways. So the issue is not where any effects will occur, but where these effects will potentially cause significant ecological change affecting priority conservation elements.	It is not clear if this MQ refers to aquatic CE occurrences or "resources" for human use, or both. Going by our "Notes" from Memo 1C, we propose using the Flint & Flint climate-impact data associated with the model they developed for their 2007 USGS publication (USGS Flint & Flint Climate Impact data requested) to assess where and to what extent major changes are forecast for monthly runoff, recharge, and snowmelt patterns. As a backup, we can use NHDPlus attributes from the USGS (nhd_bfi; nhd_ieof; nhd_recharge; nhd_ppt30yr; nhd_tmax30yr; nhd_tmin30yr) to develop a rough empirical, annual model of how runoff and recharge hydrology (the first three of these NHDPlus attribute sets) might vary in relation to climate (the last three of these NHDPlus attribute sets). This empirical model would allow us to plug in forecast future climate estimates for the latter three, to produce rough estimates of future conditions for the former three, if we found strong empirical relationships are present. In either case, we won't be able to identify "abrupt" deviations unless we work with large numbers of time steps. Since the Flint & Flint data will allow us to assess whatever time increments we need, we can decide with the BLM what increments might be most useful.
Where are aquatic resources that will experience significant and abrupt deviations from normal flow regime or mean water levels?	Ecoregion-wide	Climate Change, Hydrologic alteration	There will potentially include effects on water levels in wetlands and groundwater-driven systems, and changes in riparian inundation patterns. Plus the changes won't be in simple magnitude but may also be in the timing, duration, and frequency of different hydrologic conditions.	Same as above, but linked to identification of which aquifers support baseflow/base water levels in which water bodies (see above). Note, however, that aquifer recharge/discharge is a process taking decades to centuries (or millennia) to unfold, and so the effects of climate change on aquifer discharge rates will take a long time to become evident.
Where will aquatic resources experience significant and abrupt deviations from normal temperature regime?	Ecoregion-wide	Climate Change, Hydrologic alteration	Both "flow" and "hydrologic change will occur. Includes not just "temperature change" but change in the temperature regime.	Same as above vis Flint & Flint projections
Where are aquatic resources that will experience additional effects on physical habitat such as channel morphology due to significant and abrupt deviations in climate and hydrologic regimes?	Ecoregion-wide	Climate Change, Hydrologic alteration		This is a secondary effect of changes in runoff and recharge, per above
Military Constrained Areas				
Where are military constrained areas?	Ecoregion-wide	Military use areas, conflict of use areas, areas of moratoria, potential military	Military flight areas will show areas of potential conflict with other development types (wind). Surface disturbance can be shown with LU/LC classifications. What does contrained mean? Includes any development on BLM lands constrained by military low-flying areas. No. This may be addressed by military document which identifies suitability for tall structure development.	Military expansion areas for Twentynine Palms and Fort Irwin have been identified; military training and low flight path areas have been identified but not obtained by the team. DOD will be providing additional data early in 2011.

Management Questions: Mojave Basin & Range				
Management Question	**Relevant CEs or other unit**	**Relevant Change Agents**	**Memo 1C Notes**	**Data Sources & Recommendations**
		expansion, DOE contracted areas, installation boundaries		
Where might these areas change in the future?	Ecoregion-wide	Military use areas, conflict of use areas, areas of moratoria, potential military expansion, DOE contracted areas, installation boundaries	Coordinate with various other MQs on climate change and water resources. Consult INRMP of the relevant installations to determine available data and potential presence of CEs and CAs.	Difficult to predict as the armed forces have no official plans to change or expand land use beyond existing plans at Twentynine Palms and Fort Irwin.
Where are areas of possible expansion of military use?	Ecoregion-wide	Potential military expansion	Based on BRAC or other planning documents.	As above.
Atmospheric Deposition				
Where are areas affected by atmospheric deposition of pollutants (nutrient deposition, acid deposition, mercury deposition)?	Ecoregion-wide	Air and Water Quality: Fugitive dust, air pollution, atmospheric deposition	Atmospheric deposition affects ecosystems via both nutrient enrichment and via acid deposition; and affects some individual species through these effects and through mercury deposition. This is a known problem in the higher elevations of the western US.	We will use NADP data on Nitrogen as a stand-in for all air pollutants that involve acid deposition AND result in nutrient enrichment once buffered. We will use NHDPlus nhd_no3 and USGS-Nitrogen Groundwater Risk (gwrisk) data sets as cross-checks on the NADP regional estimates. We will use NADP data on Mercury as a stand-in for all air pollutants that can bio-accumulate and cause physiological or developmental harm.